July 2021

Binder 126, Lepocreadiidae Monalometroninae A-M [Trematoda Taxon Notebooks]

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Lepocreadiidae
Homalomentroninae

Dollfus (1950) named the genus *Trematobrien* for *T. haplochromios* from a cichlid fish, *Haplochromis*, in the Congo. He named for it a new family, Trematobrienidae, of the Allocreadioidea. This trematode resembled *Crassicutis* so much in general appearance, thick cuticula, and host, that type specimens were borrowed from the Musée Royal de L'Afrique Centrale, by courtesy of Dr. P. L. G. Benoit. An important character to determine was the presence or absence of a cirrus sac, present according to the description but not indicated in the figure of *Trematobrien*. A cirrus sac is definitely lacking (Fig. 2). Accordingly, the genus should be considered related to *Crassicutis* and can be classified in the Family Lepocreadiidae, subfamily Homalometroninae. Its similarities to *Crassicutis* are shown in Fig. 1. It differs in having united ceca and symmetrical testes. I consider the Family Trematobrienidae a synonym of Lepocreadiidae and Trematobrieninae a synonym of Homalomentroninae. >*

FROM MANTER, 1962

Homalometrinae Cable et Hunninen, 1942

Subfamily diagnosis. — Allocreadiidae: Body oval, fusiform or elongate, spinose. Prepharynx distinct, esophagus short. Ceca terminating at or near posterior extremity. Acetabulum in anterior half of body. Testes tandem, or diagonal, postequatorial. Seminal vesicle free in parenchyma. Prostatic cells lacking (?). No cirrus pouch. Genital pore immediately preacetabular or postbifurcal. Ovary submedian, pretesticular. Vitellaria in lateral fields of hindbody, may intrude into forebody, confluent in posttesticular area. Receptaculum seminis and Laurer's canal present. Uterus winding between anterior testis and acetabulum. Excretory vesicle reaching to posterior testis or ovary.

Key to genera of Homalometrinae

Body flattened oval, with very thick cuticle, smooth except for ventral side; vitellaria confluent anterior to acetabulum, leaving lateral marginal area free; genital pore immediately preacetabular ..... *Crassicutis*

Body elongate oval, spined; vitellaria not confluent anterior to acetabulum; genital pore immediately postbifurcal; excretory vesicle passing between testes ..... *Pancreadium*

Body elongate; vitellaria in hindbody ..... *Homalometron*

Homalometron Stafford, 1904

Syn. *Anallocreadium* Simer, 1939

Generic diagnosis. — Allocreadiidae, Homalometrinae: Body elongate, spinulate. Oral sucker followed by distinct prepharynx. Esophagus short, ceca terminating at posterior extremity. Acetabulum in anterior half of body. Testes tandem in postequatorial intercecal field. Vesicula seminalis free. No true cirrus pouch. Genital pore immediately pre-acetabular. Ovary submedian, just in front of anterior testis. Receptaculum seminis and Laurer's canal present. Vitellaria in hindbody, extracecal and posttesticular. Uterus winding between anterior testis and genital pore; eggs few, comparatively large. Excretory vesicle reaching to posterior testis. Parasitic in intestine of fishes.

Genotype: *H. pallidum* Stafford, 1904, syn. *Distomum* sp. Linton, 1901; *D. globiporum* Rud. of Linton, 1905 (Pl. 10, Fig. 132; Pl. 22, Fig. 291), in *Fundulus heteroclitus;* Woods Hole. Also in *Fundulus majalis, F. heteroclitus, Leiostomus xanthurus, Menticirrhus saxatilis, Morone americana, Pseudopleuronectes americanus, Tautoga onitis, Bairdiella chrysura.*

Other species:

H. armatum (MacCallum, 1895) (syn. *Distomum isoporum* var. *armatum* MacCallum, 1895), in *Aplodinotus grunniens* and *Eupomotis gibbosus;* N. America. Cysts found in foot of Unionidae — Hopkins (1934). Oculate cercaria with three pairs of penetration glands develops in *Amnicola peracuta* — Hopkins (1937).

H. elongatum Manter, 1947, in *Gerres cinereus;* Florida.

H. pearsei (Hunter et Bangham, 1932), syn. *Anallocreadium p.* H. et B., syn. of *A. armatum* — Miller, 1940, in *Aplodinotus grunniens;* Lake Erie. Also in *Chaenobryttus gulosus, Eupomotis microlophus, Helioperca mucrochira;* Tenn.

LEPOCREADIIDAE
~~ALLOCREADIIDAE~~

HOMALOMETRONINAE
Anallocreadiinae Hunter & Bangham, 1932

Allocreadiidae with spinous cuticula and no true cirrus sac. Excretory bladder sac-shaped. Genital pore preacetabular and in median line. Prepharynx present. Intestinal crura long. In intestines of fresh-water fish.

Type genus: Anallocreadium Simer, 1929

HOMALOMETRON

ANALLOCREADIUM Simer, 1929

Revised diagnosis from Hunter & Bangham:

Anallocreadiinae with the characters of the genus. Distomes up to 4 .mm. in length with extremities equally rounded. Oral sucker subterminal, acetabulum circular, at one third the length of the trematode from the anterior end. Excretory pore median, terminal; excretory vesicle extends to posterior border of testis. Testis in tandem arrangement; ovary dextral at anterior margin of anterior testis. Laurer's canal and Mehlis' gland present. Male and female systems end in an unspecialized cloacal invagination. Uterus short, between anterior testis and genital pore. Eggs few in number 85 to 110 by 40 to 70 u. In intestines of fresh-water fish.

Type species: A. armatum (MacCallum) Simer, 1929
Other species: A. pearsei Hunter & Bangham, 1932
Synonym: A armatum of Pearse, 1924

Remarks: A. armatum is not figured or described by Simer. A. pearsei has an oral sucker only slightly smaller than ventral sucker, whereas MacCallum reports an acetabulum twice the size of oral sucker for A. armatum. In A. armatum the pharynx has a length 1/3 that of the acetabulum while in A. pearsei it is ½. In A. pearsei the testes are lobate while in A. armatum they are smaller and not lobate. Eggs average slightly smaller in A. pearsei. In both species the vitellaria extend from about the posterior level of the ventral sucker to posterior end.

synonyms acc. Miller, 1940

I consider this genus a synonym of Homalometron Stafford

Anallocreadium pearsei

Homalometron Stafford, 1904

Body elongate-oval in outline, flattened, with minute spines. Suckers nearly equal in size. Prepharynx, pharynx and esophagus present. Genital pore median, directly in front of ventral sucker. Testes tandem in posterior half of body. Spherical seminal vesicle just posterior to ventral sucker. Pars prostatica free, cirrus sac absent. Ovary transversely oval, smooth, to left and anterior to testes. Large seminal receptacle. Laurer's canal present. Uterus short, with few large eggs. Vitellaria of large follicles covering much of ceca and filling the body laterally from region of ventral sucker to posterior end. Confluent behind testes. Excretory vesicle a simple tube, rather muscular.

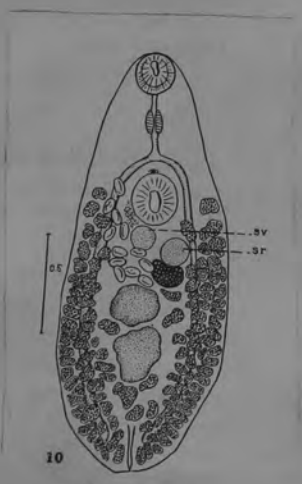
Type species: Homalometron pallidum Stafford
Syn. Dist. sp. of Linton 1901:422.

Homalometron pallidum Stafford, 1904

Length 2.72; width 1.07.
Oral sucker 0.26
Ventral sucker 0.29
Eggs 110 by 70 μ

Hosts: Fundulus heteroclitus in Maine, Mass., N.C.
Fundulus majalis in N.C.
Leiostomus majalis in N.C.

Life cycle: See Srunkard (1964)



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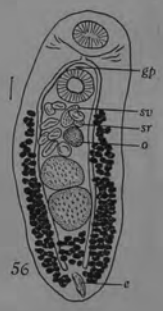

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Homalometron pallidum Stafford, 1904
Host: *Leiostomus xanthurus*
Site: intestine
Locality: Alligator Harbor

APALACHEE BAY, GULF OF MEXICO
FROM NAHHAS AND SHORT, 1965

-OVER-

Homalometron elongatum Manter, 1947

Hosts.—*Gerres cinereus* (Walbaum); *Eucinostomus californiense* (Gill), mojarra [new host record].

Location.—Entire length of intestine in *G. cinereus* and mid-intestine of *E. californiense.*

Locality.—*G. cinereus* from off Lerner Laboratory Pier, Bimini, B.W.I. [new locality record]; and *E. californiense* from Taboga Island, Panama Pacific [new locality record].

Discussion.—Manter (1947) reported *H. elongatum* from *Gerres cinereus* in Tortugas, Florida. The Bimini specimens of *H. elongatum* agree in all details with the paratypes. The single specimen from Panama appears mature in all respects except in lacking eggs, and is a little shorter than the minimum range given by Manter for *H. elongatum.* Bravo and Manter (1957) described papillae on the oral sucker of *H. elongatum.* The immature Panama specimen and the Bimini specimens have these papillae.

Sogandares, 1959

Lepocreadiidae
Homalometroninae

Homalometron pallidum Stafford, 1904

The genus *Homalometron* was erected by Stafford (1904) to contain a new species, *H. pallidum*, from the intestine of *Fundulus heteroclitus*. There was no description or figure; instead, the new species was based on the description and figure by Linton (1901) of specimens collected from *F. heteroclitus* in the region of Woods Hole, Massachusetts. The species was not named by Linton whose account (p. 442) reads, "*Distomum* sp. (Pl. XXXII, Fig. 354) Aug. 7, 1899; 12. Aug. 28, 1899; 4. Intestine. Body very minutely spinose, white, translucent; acetabulum and oral sucker about same size; outline of body, long oval; neck short, continuous with body; greatest breadth in region of testes, near posterior end; ecaudate; acetabulum sessile; rami of intestines simple, elongate; esophagus as long as pharynx; testes, two, in median line behind uterus; seminal vesicle dorsal to ovary and posterior border of acetabulum; ovary between acetabulum and testes, on right side; pharynx, subglobular; genital aperture in front of acetabulum, on median line; vitelline glands lying at posterior end and along sides of body as far as acetabulum; ova few, relatively large. Dimensions of specimen in formalin, given in millimeters: Length, 2.72; breadth, anterior 0.43, at acetabulum 0.89, middle 1.07; near posterior 0.36; diameter of oral sucker, 0.26; diameter of acetabulum, 0.29; diameter of ovary, 0.21; diameter of testes, 0.33 and 0.39; ova, 0.11 and 0.07 in the two principal diameters."

STUNKARD, 1964

Adult

Sexually mature worms have been described by Linton (1901; fig. 354); Stafford (1904); Manter (1926; figs. 54, 55, 56); and M. J. Miller (1941; fig. 2) who restudied the specimens in the Stafford collection. Linton's figure of the type specimen is reproduced (Fig. 1). Manter (1931) listed *Distomum globiporum* Rudolphi of Linton, 1905 from *Fundulus majalis* and *Leistomus xanthurus* and the worms designated as (*Lepocreadium*) *serospinosum* sp. inq. of Nicoll, 1909, as synonyms of *Homalometron pallidum*. As additional hosts, Linton (1940) listed *Menticirrhus saxatilis, Morone americana, Pseudopleuronectes americanus, Tautoga onitis* and *Bairdiella chrysura*. It is probable that specimens from some of these hosts have not been identified correctly, and there is the further possibility that worms taken from the intestine of predatory fishes may have been ingested with prey. In the present study, the largest specimen without eggs measures 1.12 mm. in length and is shown in Figure 3. Ovigerous worms measure from 0.80 to 2.80 mm. in length. The eggs are few, 3 to 15; 0.10 to 0.11 mm. in length and 0.06 to 0.07 mm. in breadth. They are not embryonated when passed.

STUNKARD, 1964
(see life cycle)

Reported from Fundulus diaphanus
in Lake Itasca, Minn.
Cf. Pearson 1966
J. Minn. Acad. Sci.
33(2): 99-101

Homalometron armatum (MacCallum, 1895) n. comb. ✓
Allocreadiidae

Allocreadium armatum MacCallum, 1895 (from Perase, 1924)

Length: of a large contracted specimen, 3.2 mm., of a smaller expanded specimen, 2.8 mm.
Width: 1.08 mm. Of a smaller expanded specimen, .53 mm.

Oral sucker: .35 mm. in diameter.

Acetabulum: (size:) .6 mm. in diameter.
(position): At psoterior end of anterior third of body.

Sucker ratio:

Esophagus: Absent.
Pharynx: About half the diameter of the oral sucker in length, and it is about as wide as long.
Genital pore (location): On the median line, anterior to the acetabulum.
Testes, shape: Somewhat lobate and slightly elongated; their long axis lying across the body.. Lie close together immediately
location: posterior to ovary between intestinal rami, tandem.
Cirrus sac (extent): Is as long as diameter of acetabulum.
Ovary, shape: Oval, long axis extending across the body.

location: On right side of body just behind the acetabulum.

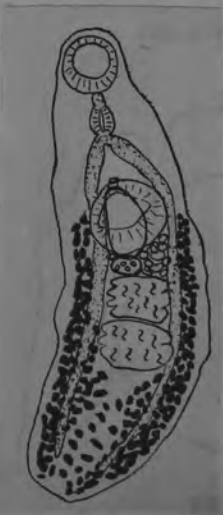
Vitellaria: Surround intestinal rami in posterior third of body and extend forward outside the rami nearly to the middle of the acetabulum.
Eggs: .11 by .07 mm.

Other features:

Host: (1). Aplodinotus grunniens Rafinesque (sheepshead)
(2). Eupomotis gibbosus (Linnaeus) (sunfishes)
Locality: (1). Lake Pepin, Wisconsin.
(2). Sturgeon Bay, Wisconsin.
Reference: Trans. of Wisconsin Acad. of Sci., Arts, and Letters, 21:147-160.
Comparisons: None mentioned.

Life cycle:

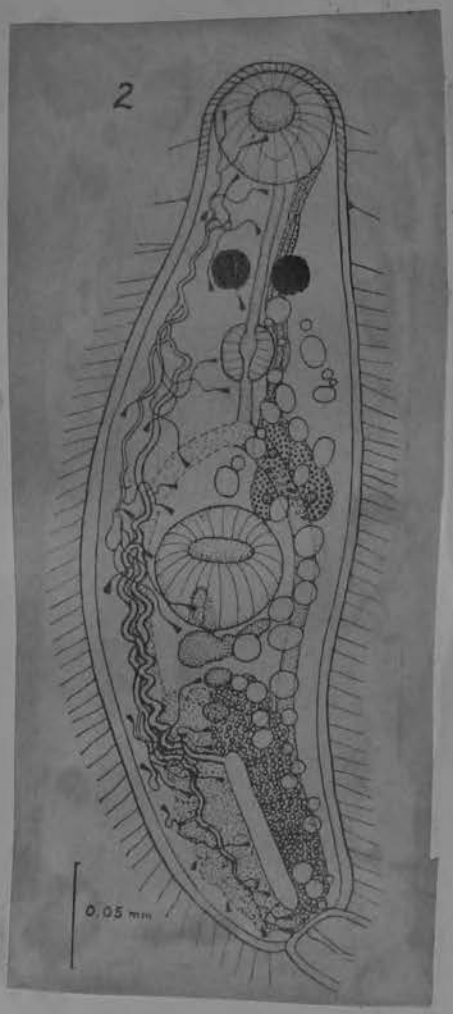
Miller (1940) considers
A. pearsei Hunter & Bangham, 1932
a synonym of A. armatum.



See Miller, 1959

R.G.

Cercaria of Homalometron armatum
from Hopkins, 1937. Jour. Parasit., 23: 94-97.
These develop in rediae in the freshwater snail,
Amnicola peracuta in Texas . Cercariae of
Microcreadium parvum in same host



Homalometron caballeroi n. sp. LAMOTHE, 1965

Descripción.— Basada en dos ejemplares maduros, son parásitos pequeños de cuerpo alargado, fusiforme, con las extremidades más o menos redondeadas, mide de 4.17 a 5.87 mm. de largo por 1.05 a 1.09 mm. de ancho a nivel del testículo posterior. Presentan una cutícula con espinas pequeñas no muy numerosas y poco visibles.

La ventosa oral subterminal, globulosa, de gruesas paredes musculosas, mide de 0.267 a 0.350 mm. de largo por 0.350 a 0.360 mm. de ancho; en medio de la cual, se abre la boca que mide de 0.051 a 0.133 mm. de diámetro longitudinal por 0.154 a 0.164 mm. de diámetro transversal.

El acetábulo casi circular, más grande que la ventosa oral, se encuentra en el tercio anterior del cuerpo, mide de 0.597 a 0.648 mm. de diámetro longitudinal por 0.618 a 0.628 mm. de diámetro transversal. La relación de diámetros entre las dos ventosas es de 1 : 1.8 a 1 : 2.2 × 1 : 1.7 a 1 : 1.7. La prefaringe es ancha, de paredes muy delgadas, mide en uno de los ejemplares estudiados 0.160 mm. de largo por 0.123 mm. de ancho; la faringe, más ancha que larga, de gruesas paredes musculosas, mide de 0.144 a 0.164 mm. de largo por 0.164 a 0.216 mm. de ancho. El esófago, más corto que la faringe, mide aproximadamente 0.061 mm. de largo: la bifurcación cecal tiene lugar a una distancia de la extremidad anterior que varía de 0.523 a 0.679 mm.

Los ciegos intestinales simples se extienden hasta cerca de la extremidad posterior del cuerpo, teniendo una anchura que varía de 0.092 a 0.123 mm.

Los testículos, de borde liso, se encuentran situados ligeramente por debajo de la mitad del cuerpo, son postacetabulares, uno abajo del otro, intercecales y se encuentran siempre tocándose por sus bordes; el anterior mide de 0.525 a 0.648 mm. de largo por 0.731 a 0.741 mm. de anchura, el posterior mide de 0.669 a 0.690 mm. de largo por 0.659 a 0.679 mm. de ancho. El espacio postesticular varía de 1.044 a 1.930 mm.

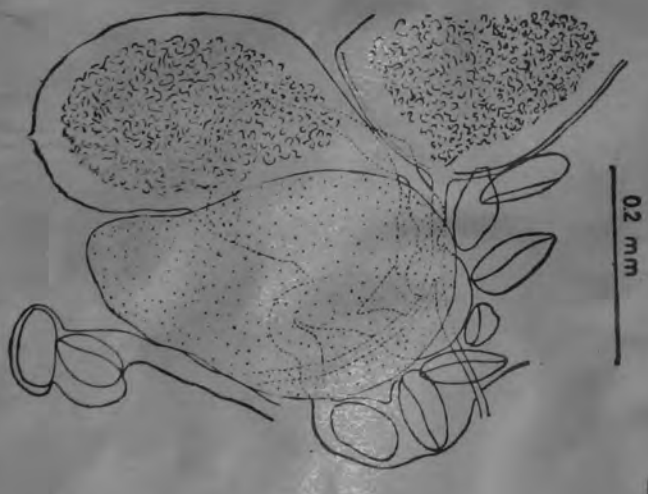


Fig. 2. *Dibujo* del complejo sexual de *Homalometron caballeroi* n. sp.

-OVER-

La vesícula seminal se encuentra por debajo del acetábulo, en la línea media o ligeramente a la izquierda, es de forma ovoide, mide de 0.319 a 0.337 mm. de largo por 0.221 a 0.267 mm. de ancho, a su borde inferior llegan los conductos eferentes que desembocan separadamente, carece de cirro y de bolsa del cirro. El poro genital es inmediatamente preacetabular y en la línea media, a una distancia de la extremidad anterior que varía de 0.844 a 1.017 mm.

El ovario, globular o ligeramente oval, se encuentra situado sobre la línea media o ligeramente a la derecha, es postacetabular y pretesticular, separado del testículo anterior por una rama uterina, mide de 0.237 a 0.278 mm. de largo por 0.298 a 0.391 mm. de ancho.

El receptáculo seminal, dorsal al ovario, se encuentra situado sobre la línea media, tiene forma oval y desemboca en el ootipo, mide de 0.365 a 0.402 mm. de largo por 0.164 a 0.225 mm. de ancho. La glándula de Mehlis pobremente desarrollada; canal de Laurer presente. Utero corto, entre el testículo anterior y el poro genital. Huevos poco numerosos, en todo el trayecto uterino, relativamente grandes, de cáscara delgada y amarillenta, miden de 0.076 a 0.084 mm. de largo por 0.036 a 0.052 mm. de ancho. Las glándulas vitelógenas están formadas por folículos vitelinos grandes que van desde un poco por debajo del acetábulo a la extremidad posterior del cuerpo, en donde son muy numerosos.

El aparato excretor está representado por una vesícula excretora tubular que se ensancha poco antes de su terminación en el poro excretor que es terminal.

Huésped: *Verrunculus polylepis* (Steindachner) «Pez puerco».

Habitat: Intestino.

Localidad: Bahía Kino, Sonora, Golfo de California, México.

Número de parásitos examinados: dos.

Ejemplares: depositados en la Colección Helmintológica del Instituto de Biología de la U. N. A. M. con el n.° 219-9.

Discusión.—Hasta la fecha el género *Homalometron* Stafford, 1904 está representado por cinco especies que son:

Homalometron pallidum Stafford, 1904.
Homalometron armatum (McCallum, 1895) Manter, 1947.
Homalometron elongatum Manter, 1947.
Homalometron pearsi (Hunter & Banghan, 1932) y
Homalometron foliatum Siddiqi & Cable, 1960.

Basándome en la descripción de estas especies, el parásito descrito en este trabajo corresponde a una nueva especie, para la cual propongo el nombre de *Homalometron caballeroi* n. sp.

Las especies que más se le asemejan, además de que son parásitos de peces marinos son: *H. pallidum* Stafford, 1904, *H. elongatum* Manter, 1947 y *H. foliatum* Siddiqi & Cable, 1960; pero difiere de ellas en varios caracteres: de *H. elongatum* Manter, 1947 por ser su cuerpo de mayor tamaño, la relación de diámetros de las dos ventosas es bastante diferente ya que en *H. elongatum* la relación es de 1 :0.9 y en *H. caballeroi* n. sp. es de 1 :1.8 en uno de los ejemplares y de 1 :2.2 en el otro; difiere también en la forma y disposición de los testículos, ya que en *H. elongatum* los testículos están separados uno del otro por una banda de folículos vitelinos y otra banda entre el testículo superior y el ovario y en *H. caballeroi* n. sp. siempre se presentan tocándose por sus bordes, pero se asemeja en la disposición general de las glándulas vitelógenas y en el tamaño de los huevecillos.

Difiere de *H. pallidum* Stafford, 1904 en el tamaño del cuerpo, en la relación de los diámetros de las ventosas y en el tamaño de los huevecillos y difiere de *H. foliatum* Siddiqi & Cable, 1960, en el tamaño del cuerpo, en la relación de los diámetros de las ventosas, en la forma y disposición de los testículos que se encuentran en tandem pero separados uno del otro, en la disposición de las vitelógenas que se inician a nivel pretesticular y en el tamaño de los huevecillos que son más pequeños que los de la especie aquí descrita.

Manter, 1947

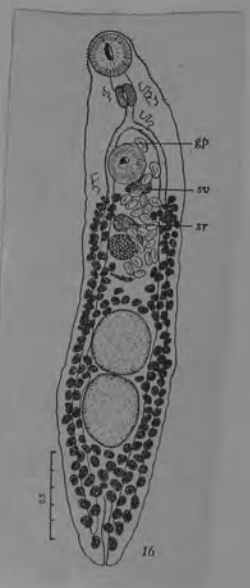
31. Homalometron elongatum n. sp.

Fig. 16

HOST: *Gerres cinereum* (Walbaum), Florida mojarra; in 12 of 15 hosts examined.
LOCATION: Intestine.

Description (measurements on 7 selected individuals): Body flattened, elongate, bluntly pointed at each end; size 1.900 to 3.116 by 0.382 to 0.611 mm; anterior portion of body spined. Oral sucker subterminal, round or slightly wider than long, 0.187 to 0.260 mm in diameter. Acetabulum from 1/2 to 1/5 body length from anterior end; slightly smaller than oral sucker; 0.161 to 0.240 mm in diameter; sucker ratio approximately 1:0.9. Prepharynx wide, usually about same length as pharynx, its walls extending beyond the anterior edge of the pharynx which seems to be surrounded by the base of the prepharynx. Pharynx longer than wide; 0.102 to 0.136 mm long by 0.077 to 0.112 mm wide. Esophagus muscular, as long as or longer than pharynx according to contraction; intestinal bifurcation about 2/3 the distance between oral sucker and acetabulum. Ceca extending to near posterior end of body. Testes large, tending to be longer than wide, smooth, tandem, near together or slightly separated, posterior to midbody, intercecal. Posttesticular space usually slightly longer than forebody. Seminal vesicle an ovoid sac near left posterior border of acetabulum. Cirrus and cirrus sac lacking. Genital pore submedian, immediately anterior to acetabulum. Ovary globular, median or to the right, midway between acetabulum and anterior testis and well separated from both. Seminal receptacle flask-shaped, entering oviduct near posterior border of ovary but largely anterior to ovary. Laurer's canal present. Vitelline follicles large, from a short distance posterior to acetabulum (anterior to ovary) to posterior end of body, confluent posterior to testes and almost so anterior to testes; dorsal, ventral and lateral to ceca. Uterus extending a short distance posterior to ovary but not as far as anterior testis, chiefly preovarian. Eggs large, thin-shelled, 74 to 90 by 42 to 54 μ.

Discussion: This species differs from *H. pallidum* Stafford, 1904 in body shape, sucker ratio, egg size, and thin-walled excretory vesicle. It differs from *H. pearsei* (Hunter & Bangham, 1932) in more posterior intestinal bifurcation, greater distance between ovary and testes, and slightly different sucker ratio. *H. armatum* (MacCallum, 1895) is not very fully described but apparently its acetabulum is only 1/2 the size of the oral sucker.



Ex. Rhaya & Manter (1967)

Homalometron elongatum Manter, 1947
Host: Gerres cinereus (J).
Site: intestine.

over

FAMILY LEPOCREADIIDAE NICOLL, 1934

Homalometron elongatum Manter, 1947 (FIGURE 96)

Hosts: *Gerres cinereus*, **Chaetodipterus faber*.
Site: intestine.
Locality: Cabo Rojo, P. R.
Deposited specimen: No. 39370.

from Sadigi + Cable, 1960

Homalometron longulum Travassos, Freitas & Bührnheim, 1965 (Est. 2, fig. 4)

Homalometron longulum Travassos, Freitas & Bührnheim, 1965: 95, 96, fig. 1

Trematódeo alongado, com cutícula espinhosa; mede 6,05 mm de comprimento por 1,12 mm de largura. Extremidade anterior atenuada; extremidade posterior arredondada. Ventosa oral subterminal, com 0,22 mm de diâmetro. Acetábulo pré-equatorial, pós-bifurcal, com 0,40 mm de comprimento por 0,37 mm de largura. Relação entre a ventosa oral e o acetábulo é de 1:1,75. Pré-faringe presente, com 0,26 mm de comprimento. Faringe pequena, musculosa, com 0,150 mm de comprimento por 0,133 mm de largura. Esôfago curto. Cecos intestinais atingindo a extremidade posterior do corpo. Poro genital pequeno, mediano, pós-bifurcal, junto ao bordo anterior do acetábulo. Bôlsa do cirro ausente. Células prostáticas não evidenciadas. Vesícula seminal presente, pré-equatorial, pré-ovariana, pós-acetabular, pequena, com 0,283 mm de comprimento por 0,100 mm de largura; liga-se ao poro genital por uma porção longa e delgada. Testículos lisos, pós-equatoriais, pós-ovarianos, intercecais, no mesmo campo e com zonas quase em contato. Testículo anterior com 0,29 mm de comprimento por 0,30 mm de largura; testículo posterior com 0,32 de diâmetro. Ovário liso, pré-equatorial, intercecal, submediano, pós-acetabular, com 0,29 mm de comprimento por 0,27 mm de largura. Glândula de Mehlis bem desenvolvida, situada ao lado e para trás do ovário. Espermateca presente, pré-ovariana, com 0,20 mm de comprimento por 0,10 mm de largura. Canal de Laurer não evidenciado. Útero, com poucos ovos, pré-ovariano. Ovos claros, operculados, com 0,113 mm de comprimento por 0,067 mm de largura. Vitelinos constituídos por numerosos folículos que se estendem da zona ovariana até a extremidade posterior do corpo; são extracecais, cecais e intercecais, confluindo na região pós-testicular e na porção do corpo compreendida entre a glândula de Mehlis e o testículo anterior. Poro excretor terminal. Vesícula excretora não observada.

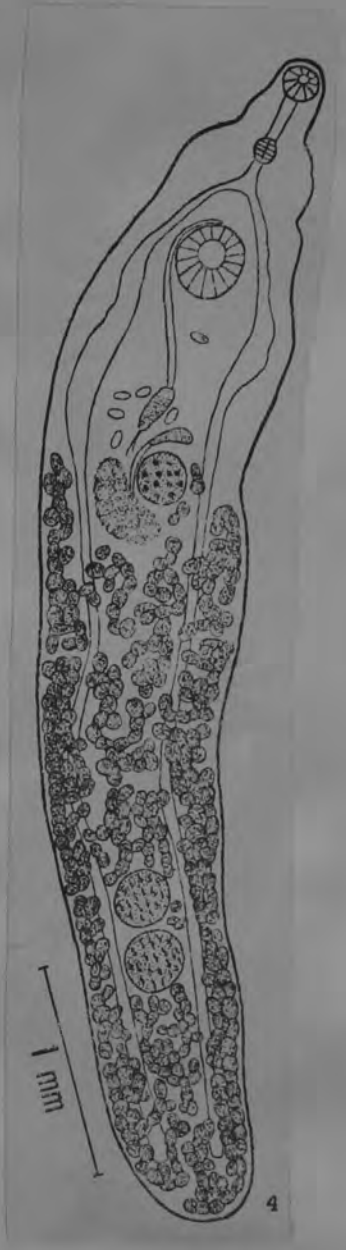
Habitat — Intestino de **Diapterus rhombeus** (Cuv. & Val.).

Proveniência — Escola de Pesca Caboclo Bernardo, Santa Cruz (Oceano Atlântico), Estado do Espírito Santo, Brasil.

Material estudado depositado na Coleção Helmintológica do Instituto Oswaldo Cruz sob o número 29 957 (tipo).

Na descrição original dessa espécie, por equívoco, foi referido como hospedador **Eugerres sp.**

Referência — 67.



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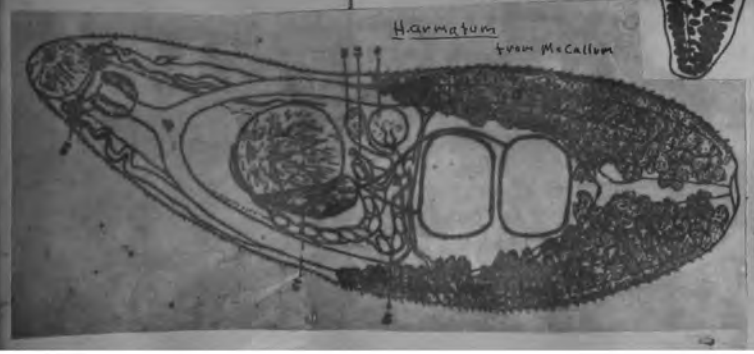
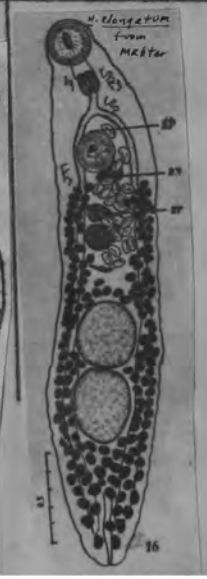
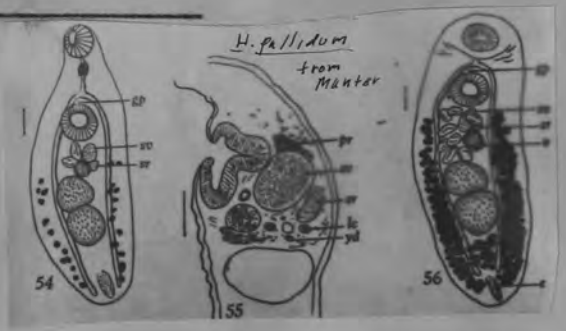
Species	H. armatum	H. pearsei	H. elongatum	H. pallidum
Body Length	3-4	1-3.5	1.9-3.116	2.72
Body Width	1.2-1.5	0.4-0.9	0.382-0.611	0.89
Sucker Ratio	1:2	approx 1:1	1:0.9	1:1
Acetabular position	post. edge ant. equator	ant. 1/3 body	ant. 1/2 to 1/5 body	ant. 1/3 body
Extent of excretory vesicle	slightly aft post. testis y-shaped. Thin?	? Thin?	? Thin.	1/2? way to post. testes. Muscular
Oral sucker	subterminal	subterminal 0.5-1/1	subterminal	terminal ?
Pharynx W:O.S.W	1:0.5	1:0.75	1:0.5	1:0.33
Cecal Bifurc.	1/2	3/4	1/3	1/4
Anterior extent of vitellaria	Rt. level to ovary. Lft. level to Sem. Rec.	Post. edge acet. to mid ovary.	level with ovary	level of ovary.
Egg size	100-110u X 60-70	85-100 u X 40-60 u	74-90 X 42 to 54 u	110 u X70 u
Special Features	Sucker Ratio 2:1	Sucker Ratio 1:1 & Thin-Walled Ex. Vesicle.	Oral sucker with papillae. Vit. between testes & testes and ovary.	Muscular ex. vesicle. sucker ratio 1:1
Figure				

Pharynx/ O.Sucker.

Between acetab & O.S







Homalometron senegalense, n. sp. (fig. 7, 8).

Host : *Solea hexophthalma* Bennett (Soleidae).
Site : Small intestine.
Locality : Cape Naze, Senegal. Fischthal & Thomas, 1972
Date : 9 February 1954.
Specimens deposited : USNM Helm. Coll. No. 71893 (holotype and paratype).

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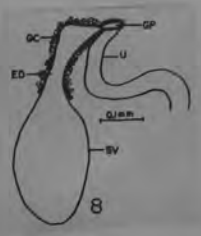

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Description (based on two adult specimens) : Body elongate, narrow, widest posttesticularly, extremities rounded, 6,060-7,585 long by 1,005-1,225 wide ; tegument spined to anterior testis level, becoming sparser as they approach latter, absent at tip of anterior end of body. Eye spots or their pigment granules absent. Forebody 840-850 long, hindbody 4,860-6,395 long, forebody-hindbody length ratio 1 : 5.7-7.6. Oral sucker ventral, longitudinally or transversely elongate, 318-330 by 260-330, aperture longitudinally oval ; preoral space 42-68 long. Acetabulum round, 350 in diameter, aperture longitudinally oval. Sucker length ratio 1 : 1.06-1.10, width ratio 1 : 1.06-1.35. Prepharynx not apparent ; pharynx overlapping oral sucker dorsally, 200-225 by 160-175, surrounded by gland cells ; oesophagus very short ; caecal bifurcation 310-325 preacetabular ; caeca narrow, thick walled, conspicuously cell lined terminating subequally 415-510 from posterior extremity.

Testes two, smooth, tandem, contiguous, overlapping slightly, intercaecal but may slightly overlap caeca ; anterior testis longitudinally or transversely elongate, 500-540 by 475-570, lying 375-505 postacetabular ; posterior testis longitudinally elongate, 560-700 by 450-535 ; posttesticular space 3,465-4,675 long, representing 57-62 per cent of total body length. Cirrus sac absent ; seminal vesicle saccular, dorsodextral to acetabulum, 300-450 by 180-300, commencing short distance postacetabular, terminating dorsal to anterior two fifths to one third of latter ; ejaculatory duct long, surrounded by prostate cells. Genital pore median, immediately preacetabular.

Ovary round, smooth, dextromedian, intercaecal but may slightly overlap caecum, contiguous with anterior testis or 70 apart, 305-350 in diameter, lying 95-125 postacetabular. Seminal receptacle elongate, saccular, anterodorsal to ovary, 400-405 by 160-250. Vitellaria commencing at anterior testis level, extending to caecal ends, terminating 200-385 from posterior extremity, follicles mainly lateral to caeca at testicular level, fields confluent posttesticularly with follicles mainly ventral. Uterus short, intercaecal but may overlap caeca, coils between anterior testis and anterior third of acetabulum dorsum, overlapping ovary, seminal receptacle and seminal vesicle dorsally. Eggs large, 10 measuring 82-97 (89) by 42-56 (49).

Excretory bladder tubular, narrow, thick walled, commencing 1,015-1,845 posttesticular, with muscular sphincter and gland cells at pore, latter ventral, 45-105 from posterior extremity.

Discussion : Six species have been described in the genus. Our form appears closest to the two species with a long posttesticular space : *H. foliatum* Siddiqi and Cable, 1960, from a pomadasyid fish from Puerto Rico ; *H. caballeroi* Lamothe, 1965, from a balistid fish from the Gulf of California, Mexico. *H. foliatum* differs from our species in being smaller, and in having the tegument entirely spined, eye spot pigment, the acetabulum smaller than the oral sucker, the prepharynx longer than the pharynx, a proportionately shorter posttesticular space, shorter eggs, and the excretory bladder commencing at the anterior testis and the pore dorsal. *H. caballeroi* differs in having the tegument entirely spined, the acetabulum considerably larger than the oral sucker, the prepharynx about the same length as the pharynx, a proportionately shorter posttesticular space, preovarian vitelline follicles, and a terminal excretory pore.

HOMALOMETRON

APOCREADIIDAE ~~n. fam.~~ YAMAGUTI, 1958

Family diagnosis. — Body fusiform to cylindrical. Lateral edges of forebody may be folded ventrad to form shallow ventral pouch, those of hindbody may be somewhat crenulated. Oral sucker small to moderately large. Prepharynx usually well developed. Esophagus very short, ceca terminating at or near posterior extremity. Acetabulum larger than oral sucker, in anterior or middle third of body, may or may not be provided with lips of lamellar structure or auricular flaps. Testes tandem or symmetrical at or behind midregion of body. Seminal vesicle claviform or saccular; pars prostatica poorly differentiated, joining uterus to form hermaphroditic duct, which is tubular and opens medianly in front of the acetabulum. No cirrus pouch. Ovary median or submedian, pretesticular. Receptaculum seminis and Laurer's canal present. Vitellaria follicular, extending in lateral fields of hindbody, confluent in postesticular area, but may extend into forebody or occupying nearly whole length of body. Uterus coiled between anterior testis or ovary and acetabulum. Eggs without filaments. Excretory vesicle tubular, reaching to posterior testis or ovary. Lymph vessels may be present. Parasites of marine fishes.

Type genus: *Apocreadium* Manter, 1937.

Key to subfamilies of Apocreadiidae

Acetabulum simple, vitellaria in hindbody; lymph vessels present ..... Apocreadiinae

Acetabulum with lips or auricular flaps; vitellaria in fore- and hindbody; lymph vessels? ..... Myzotinae

Apocreadiinae Skrjabin, 1942

Subfamily diagnosis. — Apocreadiidae: Body elongate, subcylindrical, with or without pouch-like ventral expansion of body wall in anterior region. Acetabulum simple, in anterior third of body. Testes tandem, at or near midregion of body. Ovary submedian. Vitellaria confined to hindbody. Uterus coiled between anterior testis and acetabulum. Excretory vesicle reaching to posterior testis. Lymph vessels present.

Key to genera of Apocreadiinae

Forebody without pouch-like ventral fold; body elongate ..... *Apocreadium*

Forebody with pouch-like ventral fold; body less elongate ..... *Choanodera*

Lepocreadiidae
~~Opecoelidae~~

Apocreadiinae Skrjabin, 1942.

Subfamily diagnosis : Opecoelidae : Body fusiform or cylindrical with or without folded lateral edges to form shallow ventral pouch ; unspinulate. Acetabulum larger than oral sucker with or without lips or auricular flaps. Prepharynx present ; oesophagus very short. Genital pore immediately preacetabular or at anterior tip of acetabulum. Testes tandem or symmetrically equatorial or post-equatorial. Cirrus sac absent. Vesicula seminalis claviform or saccular. Pars prostatica slightly differentiated or short. Genital sinus tubular. Ovary pretesticular. Receptaculum seminis and Laurer's canal present. Vitellaria lateral, confluent in post-testicular region, sometimes extending into forebody or occupying whole length of body. Uterus coiled between ovary or anterior testis and acetabulum. Eggs unfilamented. Excretory vesicle tubular, reaching posterior testis or ovary. Lymph vessels present or absent. Parasitic in gut of marine fishes.

Type genus : *Apocreadium* Manter, 1937.

Other genera : *Choanodera* Manter, 1940, *Myzotus* Manter, 1940. and *Marsupioacetabulum* Yamaguti, 1952.

FROM H.R. MEHRA (1966)

Apocreadium Manter, 1937

Generic diagnosis. — Apocreadiidae, Apocreadiinae: Body flattened fusiform, or narrow and elongate, crenulated along lateral margins of hindbody or not. Oral sucker rather small, prepharynx distinct, esophagus short, ceca terminating near posterior extremity. Acetabulum larger than oral sucker, in anterior half of body. Testes directly tandem in middle third of body. Vesicula seminalis reaching back of acetabulum. Ductus hermaphroditicus long. Genital pore immediately in front of acetabulum. Ovary submedian, between acetabulum and anterior testis. Receptaculum seminis present. Vitellaria occupying whole postovarian or postacetabular extracecal field and posttesticular intercecal field. Uterus coiled in intercecal field between acetabulum and anterior testis. Excretory vesicle reaching to testes. Lymphatic vessels present. Parasitic in intestine and rectum of marine fishes.

Genotype: *A. mexicanum* Manter, 1937 (Pl. 15, Fig. 192), in *Labrisomus xanti;* Mexico.

Other species:

A. balistis Manter, 1947, in *Balistes vetula;* Florida.

A. caballeroi Bravo, 1953, in *Sufflamen* sp.; Pacific coast, Mexico.

A. longisinosum Manter, 1937, in *Chelichthys annulatus* and *Spheroides angusticeps;* Galapagos, Panama.

A. synagris Yamaguti, 1953, in *Synagris taeniopterus;* Macassar, Celebes.

The Genus Apocreadium

The genus *Apocreadium* is closely related to *Homalometron*, differing in the presence of lymphatic vessels. The four new species named above raise the total to nine. All are from plectognath fishes with the exception of *A. mexicanum* which is from *Labrisomus xanti* (family Clinidae), and *A. synagris* which is from *Synagris taeniopterus* (family Lutjanidae). Of the nine species, five are from *Balistes* (trigger fishes), one from puffers, and from trunkfishes.

The genus is predominantly American; 4 species are from Bimini; 1 Tortugas; 3 from the American Pacific from Mexico to the Galapagos Islands. The only non-American species is *A. synagris* from the Celebes Islands.

The nine species may be segregated into three groups: (1) those with oral sucker possessing two lateral, fleshy lobes (*A. bravoi, A. coili, A. angustum*); (2) those with simple oral sucker and without a uroproct (*A. mexicanum, A. balistis, A. caballeroi, A. longisinosum, A. synagris*); (3) one with simple oral sucker and with a uroproct (*A. uroporctoferum*).

As the genus grows it may prove advisable to recognize three genera, or at least three subgenera on the basis of these differences.

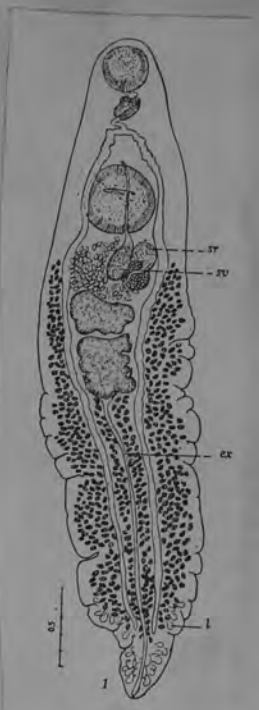
Another grouping based on the anterior confluence of vitellaria is possible. This character is more easily observed than a uroproct. Three (*A. coili, A. angustum, A. bravoi*) have vitellaria confluent anterior to the acetabulum; the other six do not.

From Sogandares-Bernal
1959

APOCREADIUM Manter, 1937

GENERIC DIAGNOSIS OF APOCREADIUM

Elongate distomes with body much flattened posterior to midbody where the edges are very thin. Acetabulum anterior to midbody, larger than oral sucker. Pharynx well developed with an anterior region of circular muscles. Ceca extending not very far apart to near posterior end. Testes in midbody region, tandem, intercecal, close together. Seminal vesicle large, undivided, sac-like. Cirrus and cirrus sac lacking. Prostate cells poorly developed. A tubular genital sinus present. Genital pore median at anterior edge of acetabulum. Ovary spherical, pretesticular, slightly to the right. Mehlis' gland large, postovarian; Laurer's canal and seminal receptacle present. Uterus pretesticular, largely to the left. Vitellaria follicular in sides of body, confluent posterior to testes. Excretory vesicle I-shaped with 2 pairs of anterior and 1 pair of posterior tubules. Lymphatic system of 4 large longitudinal vessels branching at least in posterior half of body. Type species: *Apocreadium mexicanum.*



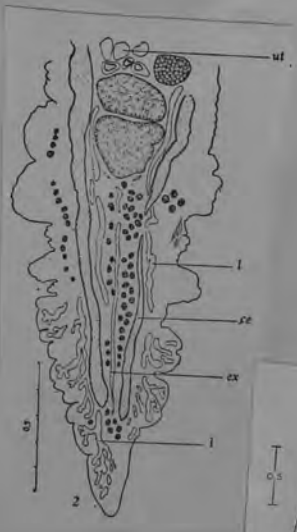
SPECIFIC DIAGNOSIS OF **Apocreadium mexicanum**

(Measurements in mms.)

Body rounded anteriorly, pointed posteriorly; scaled to midbody; 2.151 to 4.110 by 0.757 to 1.096. Acetabulum 1/4 to 1/5 from anterior end, 0.352 to 0.502 in diameter, with transverse aperture; oral sucker 0.225 to 0.315 in diameter. Prepharynx and esophagus present; intestinal bifurcation midway between suckers. Four longitudinal vessels branched in posterior half of body. Genital pore median at anterior edge of acetabulum. Seminal vesicle just posterior to acetabulum, overlapping ovary; genital sinus tubular, shorter than ejaculatory duct. Ovary spherical; seminal receptacle extending anterior to ovary; uterus to left of ovary; eggs 61 to 67 by 31 to 34 μ; vitellaria from near posterior edge of acetabulum to near posterior edge of body.

Host: *Labrisomus xanti* Gill

The name Apocreadium is from *apo*: away from and *creadium* and implies the fundamental differences between this trematode and the Allocreadiidae. The name *mexicanum* is for the locality.



other species:
A. caballaroi Bravo, 1954

Apocreadium mexicanum Manter, 1937 (FIGURE 102)

Host: **Balistes vetula.*

Site: intestine.

Locality: off Parguera, P. R.

Deposited specimen: No. 39376.

The present material agrees with Manter's (1937) description except for slight differences in sucker ratio, width of eggs, and length of posttesticular space.

from Siddiqi and Cable, 1960

-OVER-

Apocreadium mexicanum Manter, 1937**
Host: Monacanthus hispidus
Site: intestine
Locality: Alligator Harbor

This species was first described by Manter from the Pacific Coast. Siddiqi and Cable (1960) reported it from Puerto Rico but noted "slight differences in sucker ratio, width of eggs, and length of posttesticular space." Nahhas and Cable (1964) found this species in *Monacanthus hispidus* in Jamaica and noted that their specimens were "more like those of Siddiqi and Cable (1960) . . ." and that "the posttesticular space usually is less than half as long as the body but sometimes the two regions are about equal in length." Eggs of the Florida material measure 70-84 by 30-48 microns compared with 63-71 by 42-45 microns for the Jamaican material. Manter (1937) gave an egg size range of 61-67 by 31-34 microns.

APALACHEE BAY, GULF OF MEXICO
FROM NAHHAS AND SHORT, 1965

Apocreadium mexicanum Manter, 1937
Host: **Monacanthus hispidus* (J).
Site: intestine. JAMAICA

Our many specimens are more like those of Siddiqi and Cable (1960) from Puerto Rico than the species as originally described. The posttesticular space usually is less than half as long as the body but sometimes the 2 regions are about equal in length. Opaque eggs measure 63-71 by 42-45 μ, collapsed ones are 30-40 μ wide. The anterior limit of the vitellaria varies between the posterior and anterior margins of the ventral sucker.

FROM NAHHAS AND CABLE (1964)

Apocreadium mexicanum Manter, 1937
Host: *Balistes capriscus* (1 of 4)*.
Site: Intestine.
Discussion: Three immature worms are 1.8 to 3.3 long, and even though Manter (1937a:11) reported a mature specimen of *A. mexicanum* 2.2 long, I believe only one species is involved. The lymphatic vessels are branched, and the vitellaria extend anteriorly to the posterior edge of the acetabulum. The largest specimen has a forebody 23% the length of the body and a posttesticular space 43% that length; the sucker ratio is 1:1.6. The smaller specimens have longer forebodies, shorter posttesticular areas, and smaller sucker ratios. Siddiqi and Cable (1960:306) and Nahhas and Cable (1964:190) discussed some of the variability of this species.

Overstreet, 1969.

30. Apocreadium balistis Manter, 1947

Figs. 14, 15

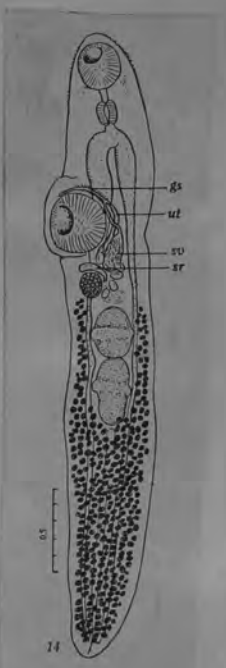
HOST: *Balistes vetula* Linn., queen triggerfish; in 1 of 7 hosts examined; 1 specimen.
LOCATION: Intestine.

Description: Body narrow and elongate; only slightly flattened; 3.731 mm by 0.620 mm; almost equally wide along most of length except that each end is slightly tapered. Spines occur near the anterior end as far back as the posterior end of pharynx and a few could be seen near the acetabulum; otherwise the body appeared smooth. Suckers round; oral sucker 0.255 mm in diameter; acetabulum 0.350 mm; sucker ratio 1:1.33. Forebody 0.944 mm. Prepharynx 0.102 mm long; pharynx 0.136 mm long by 0.127 mm wide; esophagus very short; intestinal bifurcation midway between suckers; ceca rather wide anterior to acetabulum, then narrow, ending near together near posterior end of body. Genital pore median, very close to the anterior border of acetabulum. Testes two, tandem, intercecal, in contact, just anterior to middle of hindbody, ovoidal, slightly longer than wide, each with a peculiar equatorial ridge. Postesticular region markedly longer than forebody, 1.401 mm long. Seminal vesicle a simple elongate sac, overlapping acetabulum, largely between ovary and acetabulum, 0.255 by 0.110 mm. A simple, non-muscular, non-glandular tube about 0.219 mm long leads from the seminal vesicle to the genital atrium. Genital atrium tubular, non-muscular, about 0.219 mm long, surrounded by a few gland cells; cirrus and cirrus sac lacking. Ovary globular, midway between anterior testis and acetabulum, slightly to the right; seminal receptacle elongate, preovarian; Mehlis' gland to left of ovary and extending almost to anterior testis; uterus short with a few eggs; metraterm not observed. Vitelline follicles from level of posterior edge of ovary to posterior end of body; extracecal until posterior to testes where they fill most of the body. Eggs 73 to 78 by 49 μ. Excretory pore near posterior end; excretory vesicle extending to posterior testis. Collecting tubules seen only incompletely. Two pairs of lymphatic vessels (Fig. 15) extending from near anterior end of body at least a short distance posterior to acetabulum.

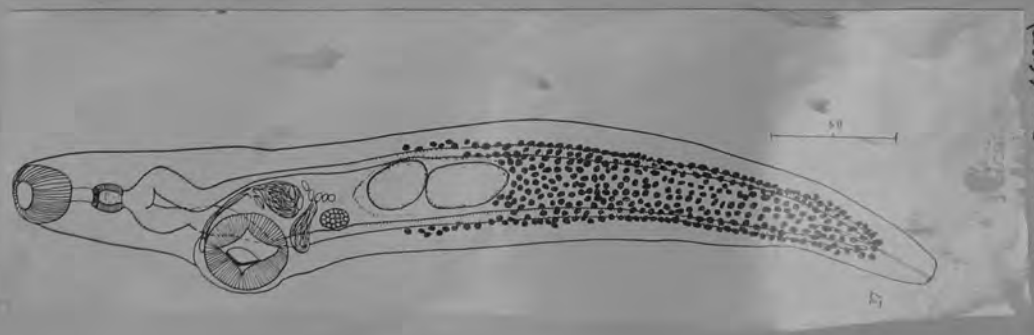
Discussion: This species, at first thought to be a species of *Homalometron*, is placed in the genus *Apocreadium* Manter, 1937 because of its lymphatic

vessels. As noted above (p. 264) these vessels constitute the chief difference between *Homalometron* and *Apocreadium*. Two species of *Apocreadium* have been described. *A. mexicanum* Manter, 1937 and *A. longisinosum* Manter, 1937, both from the Pacific. *A. balistis* is different in body shape which is little flattened, in the unbranched lymphatic vessels, and in lacking specialized circular muscles in the pharynx. The terminal genital ducts are almost exactly as in *A. longisinosum*.

It might be noted that a former student of mine, Marjorie Raecke, has reported (Proc. Nebraska Academy of Sciences, May, 1944) the occurrence of *Pseudolepidapedon balistis* Manter, 1940 from a triggerfish found at Bermuda. This species occurs in triggerfishes in the Pacific. It was not found at Tortugas but probably occurs there.



From Siddiqi and Cable (1960)



From Sogandares-Bernal (1957)

over

Apocreadium balistis Manter, 1947

Host.—*Balistes capriscus* Gmelin, ocean tally [new host record]. (Fig. 27)

Location.—1/3 intestine.

Locality.—Near Cat Cay, B.W.I. [new locality record].

Discussion.—One specimen believed to be *A. balistis* was collected. It differed from *A. balistis* in that the acetabulum is in the anterior one-fourth body as compared with the anterior one-third body in the holotype. Collapsed eggs measured from 67 to 75 by 32 to 40 microns as compared with eggs 73 to 78 by 49 microns in the holotype. In addition, the testes of the holotype have a peculiar equatorial ridge which was not present in my specimen. Since *A. balistis* was described from a single specimen, the significance of the testicular ridge in the holotype is not evident.

A. balistis is hitherto known from *Balistes vetula.*

From Sogandares-Bernal (1959)

Apocreadium balistis Manter, 1947 (FIGURE 101)

Host: *Balistes vetula.*
Site: intestine.
Locality: off Parguera, P. R.
Deposited specimen: No. 39375.

The present material agrees in most details with Manter's (1947) description based on a single specimen, except that the sucker ratio is slightly different, the pharynx is smaller, and the testes lack equatorial ridges.

from Siddiqi + Cable, 1960

Apocreadium balistis Manter, 1947
Host: Balistes vetula (J). JAMAICA
Site: intestine.

Of 3 specimens, one of which was immature, none shows ridges on the testes.

FROM NAHHAS AND CABLE (1964)

Apocreadium balistis Manter, 1947
Host: Balistes capriscus
Site: Intestine
Locality: Santa Rosa Island, Pensacola Bay, Florida

From Nahhas and Powell, 1971

Apocreadium caballeroi ~~n. sp.~~ BRAVO-HOLLIS, 1954

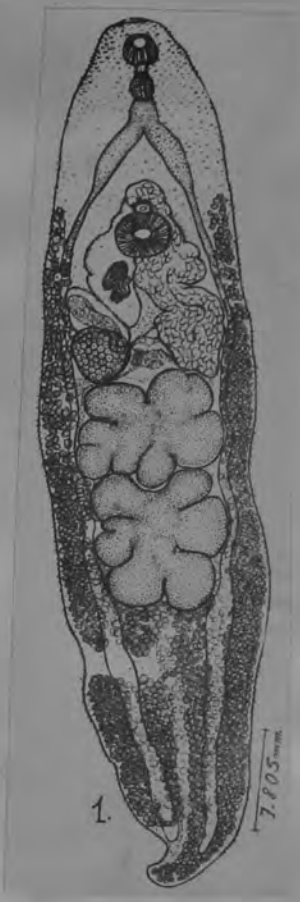
Unicamente cuatro ejemplares se localizaron en el intestino de un pez Sufflamen sp., conocido en el puerto con el nombre vernáculo de "botas" o "pez puerco".

Los parásitos son alargados, con el extremo anterior redondeado y el posterior terminado en punta recurvada; las paredes laterales postesticulares son ligeramente onduladas. Miden de longitud total de 4.497 a 8.225 mm., y de ancho a nivel del testículo anterior de 1.470 a 1.872 mm. La cutícula es delgada, está recubierta hasta muy cerca del extremo posterior de pequeñas estructuras escamiformes, siendo más abundantes en la zona preacetabular. El acetábulo dista del extremo anterior de 1.102 a 1.645 mm.; es casi esférico pues mide de diámetro longitudinal de 0.323 a 0.402 mm. y de diámetro transversal de 0.323 a 0.420 mm.; sus paredes son musculosas. La ventosa oral es subterminal, globoide, mide de diámetro longitudinal de 0.192 a 0.315 mm. y de diámetro transversal de 0.175 a 0.315 mm. La relación entre los diámetros de las dos ventosas es: la del diámetro longitudinal de 1:1.3 a 1:1.6, la del diámetro transversal de 1:1 a 1:1.6.

La prefaringe es de paredes muy delgadas, mide de largo de 0.064 a 0.122 mm., de ancho de 0.064 a 0.087 mm.; la faringe mide de largo de 0.172 a 0.192 mm., por de 0.148 a 0.180 mm. de ancho, y presenta bandas musculares longitudinales en su mayor extensión, pero que en el extremo anterior se arreglan en sentido circular formando una especie de corto prebulbo faríngeo; el esófago es corto y ancho, de paredes delgadas, y mide de largo de 0.120 a 0.288 mm. por de 0.124 a 0.210 mm. de ancho; la bifurcación cecal se inicia en la zona media entre la ventosa oral y el acetábulo; los ciegos terminan muy cerca del extremo posterior, precisamente donde se inicia el angostamiento caudal.

Los testículos ocupan el tercio medio del cuerpo acercándose más bien al tercio posterior; son intercecales, uno detrás del otro, tocándose sus campos; presentan de seis a ocho lobulaciones profundas. El testículo anterior toca el borde posterior del ovario; mide de largo de 0.840 a 1.225 mm., de ancho de 0.962 a 1.277 mm.; el testículo posterior mide de largo de 0.962 a 1.365 mm. por de 0.875 a 1.149 mm. de ancho; se notan los conductos eferentes que pasan por uno y otro lado de los testículos; la vesícula seminal mide de largo de 0.437 a 0.787 mm., de ancho de 0.210 a 0.437 mm., y está situada entre el acetábulo y el receptáculo seminal; la próstata es corta, pasa por el acetábulo, terminando en el conducto hermafrodita, y es difícil de teñir con los colorantes; el conducto hermafrodita es muy corto, poco perceptible, sube verticalmente por el lado anterior del acetábulo en donde se encuentra el poro genital.

El ovario es casi esférico, situado hacia el lado izquierdo intercecal, entre el testículo anterior y el receptáculo seminal, y mide de diámetro longitudinal de 0.402 a 0.490 mm., de diámetro transversal de 0.297 a 0.490 mm.; la glándula de Mehlis se encuentra en el centro de la zona intercecal pretesticular, circundada hacia abajo por el testículo anterior, al lado izquierdo por el ovario y el receptáculo seminal, al lado derecho por el útero y hacia arriba por asas uterinas y la vesícula seminal; el canal de Laurer está presente; el receptáculo seminal tiene el aspecto de bolsa, se encuentra situado oblicuamente entre el ovario y la vesícula seminal, mide de largo de 0.420 a 0.720 mm. por de 0.227 a 0.367 mm. de ancho.



-OVER-

y presenta un conducto que pasa por detrás del ovario formando una asa que va a desembocar en la glándula de Mehlis; el útero ocupa el lado derecho intercecal entre el acetábulo y el testículo anterior; el metratermo sube un poco más arriba del poro genital, y luego desciende para desembocar en el conducto hermafrodita; los huevos son de cáscara gruesa amarillenta, y en el polo opuesto al opérculo presentan una pequeña cresta; miden de 0.068 a 0.072 mm. de largo por de 0.044 a 0.048 mm. de ancho. Las vitelógenas se inician un poco antes del borde anterior del acetábulo, terminando en el extremo posterior; desde su iniciación hasta el borde posterior del testículo posterior son extracecales y cecales, después se distribuyen en cuatro bandas longitudinales, haciéndose confluentes detrás del testículo posterior; los viteloductos se ven con mucha claridad al desembocar en la glándula de Mehlis, en donde se fusionan. La vesícula excretora es tubulosa y el poro excretor está en la porción subterminal. No fué visible el aparato linfático.

Hospedador: **Sufflamen** sp.

Localización: Intestino delgado.

Distribución geográfica: Costa del Pacífico a la altura de Puerto Vallarta, Jalisco.

Tipo: Colección Helmintológica del Instituto de Biología. No. 25-20.

Discusión.—**Apocreadium caballeroi** n. sp., pertenece a la familia **Schistorchiidae** Yamaguti, 1942, por presentar conducto hermafrodita tubular, poro genital preacetabular, por la posición del útero, por carecer de bolsa del cirro y por la estructura del aparato excretor. De los géneros pertenecientes a esta familia, Apocreadium Manter, 1937, es el que corresponde a nuestros ejemplares por coincidir en la mayoría de sus caracteres. Se han descrito cuatro especies hasta la fecha: **Apocreadium mexicanum** Manter, 1937, **A. longisinosum** Manter, 1937, **A. balistes** Manter, 1940, y **A. synagris** Yamaguti, 1953.

Difiere nuestra especie de las arriba citadas, por presentar el conducto hermafrodita tan corto que en dos de los ejemplares da la impresión de desembocar el metratermo y la próstata separadamente en el poro genital; sin embargo, en los otros dos ejemplares se pudo distinguir, aplicando el objetivo de inmersión; además, por la forma característica de los testículos que es constante en los cuatro ejemplares, y asimismo por la manera como termina el extremo posterior, siempre en punta curvada, que da la sensación de ser retráctil; los huevos en las especies de Manter y en la de Yamaguti varían entre 0.073 y 0.102 mm. de largo; en la nuestra, los mayores llegan a 0.088 mm.; las vitelógenas en las especies de Manter se inician después del acetábulo, en **A. synagris** muy pocos folículos se hacen ligeramente preacetabulares; en cambio en **A. caballeroi** n. sp. se inician antes del acetábulo. Las estructuras escamiformes cubren todo el cuerpo en esta especie como en **A. synagris**; pero además de las diferencias ya anotadas, también se distingue de **A. synagris** en la posición del ovario; en todas las especies incluyendo **A. caballeroi** este órgano está tocando el borde anterior del testículo anterior, mientras que en **A. synagris** está muy separado. Por todos estos caracteres, consideramos nuestros ejemplares como pertenecientes a una nueva especie.

Lepocreadiidae

Apocreadium **cryptum** sp. n.
Figure 19 Overstreet, 1969

Hosts: *Anisotremus virginicus* (1 of 6); *Haemulon parrai* (1 of 7), type host; additional hosts from Florida Keys cited in discussion.

Site: Pyloric caeca and intestine.

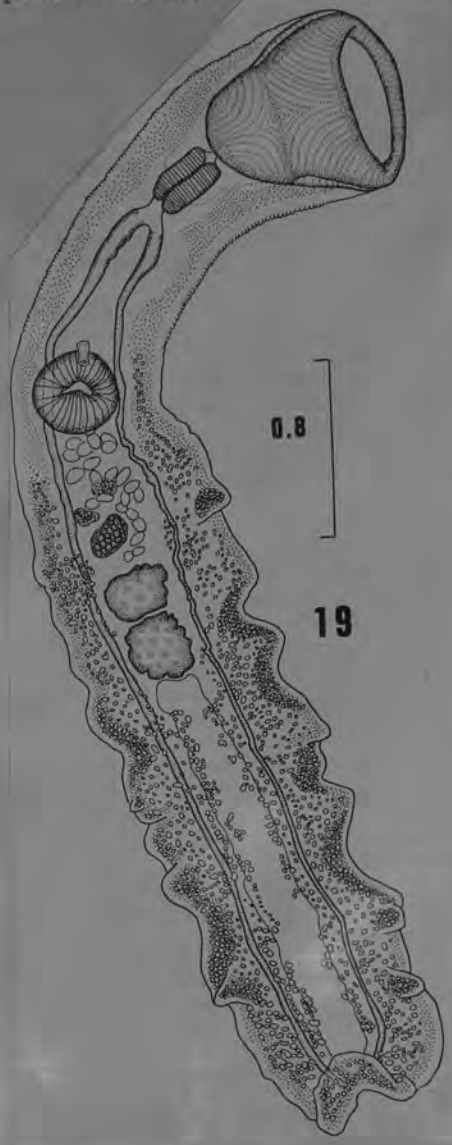
Holotype: U. S. N. M. Helm. Coll. No. 71304, paratype: No. 71368.

Description (based on 6 mature specimens from Biscayne Bay and Florida keys): Body elongate, 4.5 to 9.3 long by 0.98 to 1.53 in maximum width, hindbody extremely foliate usually with median indentation at posterior extremity. An immature individual 4.0 long. Cuticle thick, unspined. Little, if any, eyespot pigment in mature specimens; more conspicuous in immature individuals. Oral sucker funnel-shaped, 0.71 to 1.01 long by 0.68 to 1.37 wide. Acetabulum 0.34 to 0.54 long by 0.30 to 0.59 wide. Sucker ratio 1:0.4 to 0.5. Forebody 30 to 36% of body length. Prepharynx longer or shorter than pharynx. Pharynx 0.19 to 0.32 long by 0.20 to 0.36 wide, without prominent anterior circular muscle band. Length of esophagus variable, up to 80% as long as pharynx. Intestinal bifurcation midway between suckers or closer to oral sucker. Caeca narrow, terminating blindly near posterior end of body.

Testes lobate, tandem, intercaecal, in contact or separated; separated to a greater extent in larger specimens; anterior testis 0.15 to 0.31 long by 0.28 to 0.38 wide; posterior testis 0.19 to 0.41 by 0.26 to 0.35. Post-testicular region 31 to 40% of body length. Cirrus sac absent. Seminal vesicle saccate, extending to roughly midway between acetabulum and ovary. Entire length of pars prostatica surrounded by prostatic cells, more conspicuous and numerous anteriorly. Genital atrium tubular. Genital pore median or slightly submedian, anterior to or ventral to acetabulum.

Ovary smooth or slightly irregular, 0.11 to 0.30 long by 0.20 to 0.28 wide; anterior and slightly dextral to anterior testis, separated by either more or less than length of testis. Seminal receptacle between seminal vesicle and ovary. Mehlis's gland between ovary and anterior testis. Vitelline follicles numerous, those containing yolk extending from level between seminal vesicle and acetabulum to posterior end of body; smaller gland cells, without yolk granules, extending forward to oral sucker. Uterus joining male duct near anterodorsal portion of acetabulum. Eggs 92 to 111 by 58 to 67 microns.

Excretory vesicle terminating anteriorly at posterior edge of rear testis. Excretory pore subdorsal. Lymphatic system conspicuous with longitudinal vessels, 3 pairs in 1 specimen, 2 in another, running the length of the body; numerous branches in hindbody.



Discussion: This species differs from all others in *Apocreadium* and *Homalometron* in having a funnel-shaped oral sucker and a more foliate hindbody. The only other unspined *Apocreadium* is *A. longisinosum* Manter, 1937.

Three larger specimens of *A. cryptum* were donated by Dr. Robert Schroeder, who collected them from the pyloric caeca of *Haemulon sciurus* and *H. plumieri* caught near Lower Matecumbe Key, Florida. They differ from smaller individuals by having a more contracted pharynx and a greater number of eggs with a larger mean size, but the largest individual from *H. parrai* also has large eggs. A large specimen has one anomalous caecum which is completely interrupted to form a short branch joining the normal caecum and another portion with two blind ends extending the length of the vitellaria and lacking well-developed epithelium of normal caeca. No evidence of injury or degeneration as the cause of this abnormality was observed.

The name *cryptum* refers to the sometimes secret habitat of this species in a pyloric caecum.

APOCREADIUM FOLIATUM (SIDDIQI AND CABLE, 1960) OVERSTREET, 1969

SYN. *Homalometron foliatum* ~~n. sp.~~ (FIGURE 97) Siddiqi & Cable, 1960

Description based on 5 specimens with characters of the genus. Body 1.540 to 2.457 long, 0.357 to 0.476 wide, elongate, hindbody foliate, anterior end bluntly round. Cuticle spinose, eye-spot pigment present. Oral sucker slightly subterminal, subspherical, 0.196 to 0.287 in diameter. Ventral sucker 0.140 to 0.168 by 0.175 to 0.189. Sucker ratio 1:0.76. Prepharynx somewhat longer than pharynx, which measures 0.070 to 0.084 in diameter, esophagus about as long as pharynx, intestinal bifurcation about midway between suckers; ceca simple, slender, ending blindly near posterior end of body. Genital pore median, at anterior margin of ventral sucker. Cirrus sac absent; seminal vesicle sac-shaped, oval, posterior to ventral sucker, to right of midline, ejaculatory duct long and narrow. Testes 2, 0.091 to 0.175 by 0.168 to 0.182, smooth to irregular, tandem, close together, intercecal, near midlevel of body. Ovary 0.084 to 0.126 in diameter, smooth, median or submedian, about midway between ventral sucker and anterior testis. Seminal receptacle small, on right, anterodorsal to ovary. Vitelline follicles from testicular level to posterior end of body, almost filling posttesticular space. Uterus scanty, extending a short distance posterior to ovary before ascending toward genital pore. Eggs few, 0.066 to 0.077 by 0.045 to 0.053. Excretory vesicle sac-shaped, extending to anterior testis; excretory pore dorsal, near posterior end of body, with sphincter.

Host: *Haemulon flavolineatum*.

Site: intestine.

Locality: Mona Island, P. R.

Type specimen: Holotype No. 39371.

Homalometron foliatum differs from *H. pallidum* Stafford, 1904, *H. armatum* MacCallum, 1895, and *H. pearsi* Hunter and Bangham, 1932, in sucker ratio, extent of vitellaria, egg size and location of testes. It differs from *H. elongatum* in the position of the ventral sucker and testes and in the extent of vitellaria.

97

Homalometron foliatum Siddiqi & Cable 1960

Hosts: Haemulon album (C); *H. flavolineatum* (C, J); **H. sciurus* (J); **Lutianus mahogoni* (C); **Brachygenys chrysargyreus* (C).

Site: intestine.

Thirty individuals of this species agree with the original description except that the body length is up to 3.956, the sucker ratio ranges from 1:0.70-1.03, the vitellaria may reach the anterior margin of the ovary, and egg size is 66-90 by 45-60 μ.

From Nahhas & Cable, 1963

Lepocreadiidae

Apocreadium foliatum (Siddiqi & Cable,1960) Overstreet,1969

Apocreadium foliatum (Siddiqi and Cable, 1960) comb. n.
Figure 18 Overstreet, 1969

Homalometron foliatum Siddiqi and Cable, 1960.

Hosts: *Haemulon aurolineatum* (1 of 7)*; *Haemulon carbonarium* (1 of 1)*; *Haemulon parrai* (3 of 7)*.

Site: Intestine.

Specimen deposited: U. S. N. M. Helm. Coll. No. 71303.

Discussion: I place this species in the genus *Apocreadium* because it possesses a prominent lymphatic system. There are two pairs of longitudinal vessels which extend almost the entire length of the body and give off numerous branches, primarily in the hindbody.

My 13 wholemounts and 2 sectioned specimens are 1.5 to 5.5 long by 0.44 to 0.85 wide, with an immature specimen 1.74 long. The cuticular spines cover the entire body of immature specimens but only near the testicular level in adults. The prepharynx may be as short as 1/3 that of the pharynx and the seminal vesicle overlaps or is slightly anterior to the ovary, predominantly on the left side. Eggs are 85 to 98 by 48 to 62 microns. With the exception of being larger worms with correspondingly larger organs, my specimens agree with those from *Haemulon sciurus*, lent by Dr. R. M. Cable from his Jamaican collection. Nahhas and Cable (1964:184) discussed specimens which had vitellaria extending to the ovarian level and had a larger body, wider range in sucker ratio, and larger eggs than in those of the original description. The excretory vesicle in my specimens and the borrowed ones extends only to or slightly beyond the posterior border of the rear testis, rather than to the anterior testis.

Apocreadium foliatum differs from *A. balistis* Manter, 1947, *A. caballeroi* Bravo-Hollis, 1953, *A. longisinosum* Manter, 1937, *A. mexicanum* Manter, 1937, and *A. synagris* Yamaguti, 1953, in usually having an acetabulum smaller than the oral sucker. In this respect, *A. folliatum* is more like the species of *Apocreadium* described below.

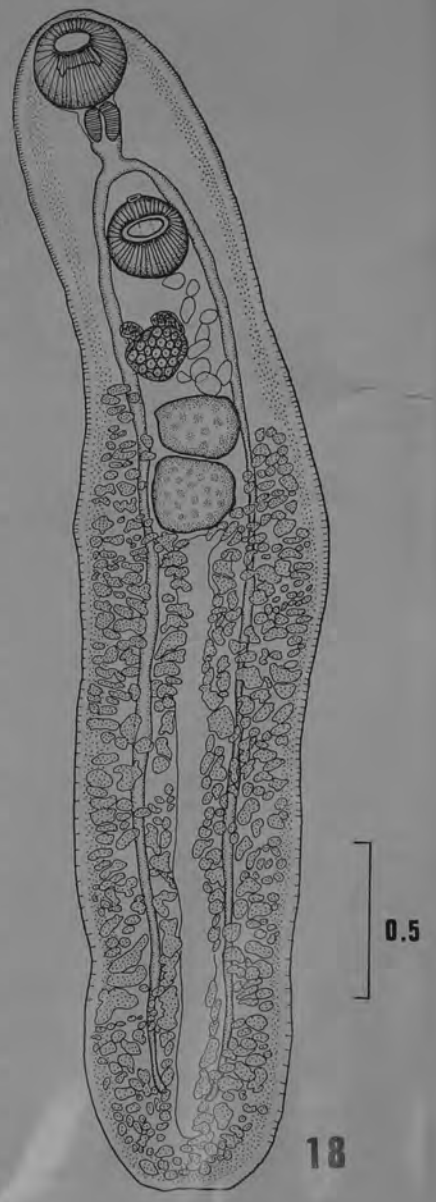


Figure 18. *Apocreadium foliatum*, ventral view.

Manter, 1937

Apocreadium longisinosum, new species
(Plate 2, figs. 4-7)

Hosts: *Cheilichthys annulatus* (Jenyns)
Albermarle Island and Charles Island, Galapagos Islands
Sphenoides anguiticeps (Jenyns)
Charles Island, Galapagos

Position: rectum

Incidence: 2 to 10 in a host, total of 15 collected from 3 hosts.

The body is orange-yellow in its posterior half, unspined, more or less flattened, 6.57 to 9.65 by 1.552 to 2.403 mm., widest about at midbody, tapering toward each end. A 4.650 mm. specimen was immature. The posterior third of the body is thin and flexible with numerous lateral folds. It tapers sharply to a pointed posterior end. The anterior half of the body is more plump, smooth, and tapers gradually. A small, fleshy preoral lobe is present. The oral sucker is subcircular but usually slightly longer than wide, 0.375 to 0.532 mm. in transverse diameter. The acetabulum is about ¼ body length from the anterior end, is longer than wide, 0.675 to 0.885 mm. in transverse diameter. Its aperture is longitudinal. The sucker ratio is approximately 5:8. The forebody measures 1.360 to 2.430 mm.

There is a fairly short prepharynx (about ⅓ pharynx length). The pharynx is usually somewhat pyriform in shape. The anterior third is more narrow, provided with a larger number of circular muscles, and separated from the posterior region by a very slight constriction. Muscles extend from the oral sucker to the pharynx outside the prepharynx. The esophagus is approximately the same length as the prepharynx. The intestinal bifurcation is usually a little nearer the oral sucker than the acetabulum but it may be approximately midway between the suckers. The narrow ceca extend some distance in from the body margins to within a short distance of the posterior end. They do not reach the posterior end and may fail to do so by some distance. One curious abnormality involved the left cecum which was almost completely degenerate except for a short normal-appearing stub barely reaching beyond the bifurcation and ending abruptly. The remainder of the cecum was represented by a few strands of fine fibrous tissue.

Apocreadium longisinosum Manter, 1937

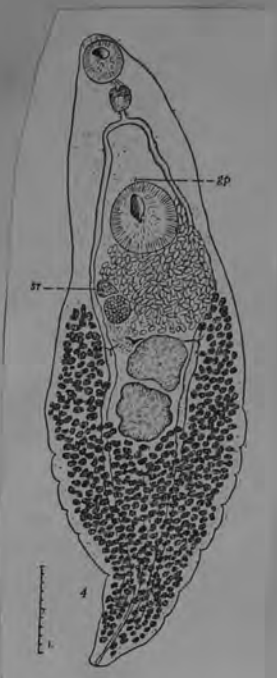
ior to midbody. Seminal vesicle elongated sac-like from acetabulum to near ovary; pars prostatica about as long as vesicle, straight; ductus hermaphroditicus a simple muscular tube as long as pars prostatica. Ovary globular; Mehlis' gland posterior to ovary; seminal receptacle anterior to ovary; uterus between testes and acetabulum; eggs 88 to 102 by 48 to 60μ; vitellaria from ovary to posterior end, confluent behind testes. Excretory vesicle extending to testes; 2 pairs of anterior and 1 pair posterior collecting tubules. Lymph vessels well developed, much branched, apparently fundamentally 2 pairs of longitudinal stems forking to form 4 pairs along much of body length. Type host: *Cheilichthys annulatus*. Other host: *Spheroides angusticeps*, a related fish. Type locality: Galapagos Islands.

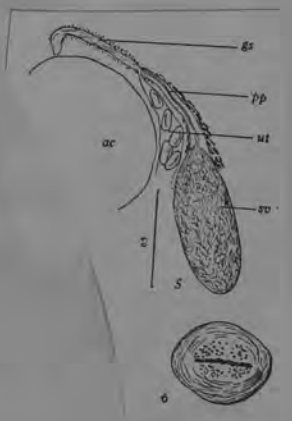
The name *longisinosum* refers to the long genital sinus.

Comparisons. A. longisinosum is more than twice larger than *A. mexicanum* and the body is relatively wider. The aperture of the acetabulum is longitudinal rather than transverse. The vitellaria do not nearly reach the acetabulum as they do in *A. mexicanum*, a difference correlated with the larger uterus in *A. longisinosum*. In *A. longisinosum* the genital sinus is much longer; the eggs much larger (maximum length 102 μ compared with 67 μ); the lymph vessels more branched anteriorly. In spite of these differences the species are very similar and clearly congeneric.

There are genera of the Allocreadiidae with the cirrus sac weakly developed or lacking, for example the Anallocreadiinae and Opecoeliinae, but Apocreadium differs from most in its tubular genital sinus and from all in its lymphatic system. It is probably significant that the Anallocreadiinae which lack a cirrus sac also possess a tubular genital sinus described as "a common tube" in the form of an "unspecialized cloacal invagination" by Simer (1929, p. 564) for *Anallocreadium armatum;* as a "long genital sinus" by Manter (1926, p. 87) for *Homalometron pallidum;* as "an invaginated cloaca" by Hunter & Bangham (1932, p. 138) for *Anallocreadium pearsei;* but as a "genital atrium" by Manter (1936, p. 34) for *Crassicutis cichlasomae*. In this latter case however, the "atrium" may be tubular in form.

The genus Apocreadium then shows evidence of relationship to the Anallocreadiinae. On the other hand, however, its lymphatic vessels, the structure of the pharynx and the excretory system sug-





gest the genera Megasolena and Hapladena for which Manter (1935, p. 438) named the subfamily Megasoleninae. The essential difference is the presence of an hermaphroditic sac in the Megasoleninae. Apocreadium seems to stand almost midway between these two subfamilies. If included in the Megasoleninae, the subfamily (and family) description must be altered to include forms with neither hermaphroditic nor cirrus sac; if included in the Anallocreadiinae the subfamily must be extended to include forms with a lymphatic system. For the present, the writer prefers to recognize the lymphatic vessels as of fundamental significance, especially since their presence is again associated with pharyngeal modifications and to classify Apocreadium in the Megasoleninae.

Apocreadium longisinosum Manter, 1937

Host.—*Sphoeroides annulatus* (Jenyns), tamboril.

Location.—Intestine.

Locality.—Bella Vista Beach, Panama City Panama Pacific.

Discussion.—*A. longisinosum* in the collection possessed eggs whose maximum measurements were 105 microns. I have compared my specimens with paratypes and they agree in all details. Manter (1937) described the species in detail and aside from egg size nothing more need be mentioned here regarding its morphology.

Caballero, et al, (1952) reported an immature specimen of this species from *Sphoeroides annulatus* in Panama.

FROM SOGANDARES-BERNAL (1959)

Apocreadium manteri ~~sp. n.~~ Overstreet, 1970
(Figs. 1, 2)

Description (based on 9 mature specimens)

Body 2,306 to 4,801 long by 608 to 1,590 wide, usually widest near level of posterior testis. Tegument with blade or trough-shaped scales, each with 1 to 6 embedded spines; scales more dense on forebody, sparse on dorsal portion of hindbody. Eyespot pigment dispersed and sparse. Oral sucker subterminal, without lateral fleshy lobes adjacent to mouth, 233 to 416 long by 219 to 374 wide. Acetabulum 282 to 559 long by 284 to 533 wide. Sucker width ratio 1:1.3 to 1.5. Forebody 20 to 28% of body length. Prepharynx usually shorter than pharynx. Pharynx 114 to 186 long by 91 to 206 wide. Esophagus either longer or shorter than pharynx depending on its state of contraction, surrounded by numerous glandular cells. Intestinal bifurcation roughly halfway between pharynx and acetabulum; ceca terminating 155 to 356 from posterior end of body.

Testes tandem, contiguous or nearly so, usually slightly irregular in shape; anterior testis 220 to 477 long by 271 to 514 wide with anterior border either slightly anterior or posterior to midbody; posterior testis larger, 281 to 608 long by 290 to 524 wide. Posttesticular space 26 to 35% of body length. Cirrus sac absent. Seminal vesicle saccate, 208 to 542 long by 81 to 215 wide, usually overlapping ovary. Pars prostatica shorter than and extending dorsal to or along either side of acetabulum. Prostatic cells few. Genital atrium tubular. Genital pore median, immediately anterior to acetabulum.

Ovary globular, dextral or occasionally median, roughly midway between anterior testis and acetabulum, 154 to 309 long by 184 to 402 wide. Seminal receptacle either larger or smaller than seminal vesicle, at or near ovarian level. Mehlis' gland between anterior testis and ovary. Laurer's canal present. Vitellaria consisting of numerous follicles, extending between level near base of acetabulum and posterior end of body, occasionally a few follicles overlapping testes. Eggs 84 to 112 long by 58 to 70 wide.

Excretory vesicle terminating anteriorly at or a short distance posterior to rear testis; pore dorsal, subterminal. Lymphatic system inconspicuous with 2 pairs of narrow longitudinal vessels extending most of body length; occasionally branching.

Type host: Leiostomus xanthurus. (LACÉPEDE), SPOT, SCIAENIDAE
Site: Intestine, usually anterior portion.
Locality: Bernard Bayou to Horn Island, near Ocean Springs, Mississippi. (GULF OF MEXICO)
Holotype: USNM Helm. Coll. No. 71477, paratype: No. 71478.

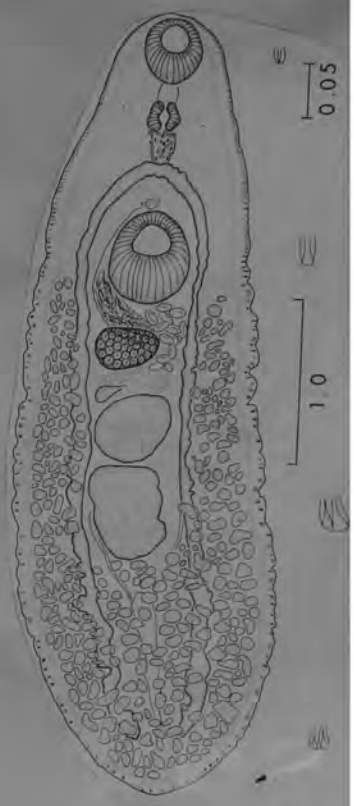
This species is named in honor of Dr. Harold W. Manter.

DISCUSSION

This species apparently differs from the other eight species of *Apocreadium*, except *A. foliatum* (Siddiqi and Cable, 1960) Overstreet, 1969, by having multispined scales. I reexamined specimens of *A. foliatum* and found the undescribed multispined scales present. Some specimens of both species, however, have the majority of the scales containing a single spine. *Apocreadium manteri* differs from *A. foliatum* by having a shorter posttesticular space, a greater sucker width ratio, and more anteriorly extending vitelline follicles. In relation to these and other features, it is most similar to *A. uroproctoferum* Sogandares-Bernal, 1959, from which it can be separated by having eggs 84 to 112 by 58 to 70 rather than 64 to 80 by 40 to 45 and not possessing a uroproct.

The lymphatic system, especially in the hindbody, is difficult or impossible to see in some individuals of several species of *Apocreadium*. Even though it is the only character used to distinguish *Apocreadium* from *Homalometron*, both *A. synagris* Yamaguti, 1953, and *A. caballeroi* Bravo-Hollis, 1954, were described without the system being evident. Fischthal and Kuntz (1965) have since reported its presence in the former species. On the other hand, if *H. caballeroi* Lamothe, 1965, is shown to have a lymphatic system, that species could be considered a synonym of *A. balistis* Manter, 1947.

Dactylotrema squamatum Bravo-Hollis and Manter, 1957, also has similar scales on the tegument. The presence of multispined scales on *A. manteri* and *A. foliatum* is additional morphological evidence for placing *Apocreadium* into the Homalometroninae, in which *Dactylotrema* is a member, as suggested by Manter (1947), but not followed by all recent workers. I follow the lepocreadiid classification of Howell (1966).



7. *Apocreadium synagris* n. sp. Yamaguti, 1953.
Pl. III, Fig. 12.

Habitat. Small intestine of *Synagris taeniopterus* (Valenc.).

Material and locality. 5 mature and 3 immature specimens; Macassar.

Body lanceolate, with blunt-pointed extremities, 2.3 – 5.3 mm in length, 0.4 – 1.05 mm in maximum width in ovariotesticular region, covered with spines all over, though sparsely toward posterior extremity. Preoral lobe indistinct. Oral sucker subterminal, 0.15 – 0.28 × 0.18 – 0.3 mm. Prepharynx 50 – 200 μ long. Pharynx subglobular to barrel-shaped, three-lobed in front, 0.1 – 0.18 × 0.095 – 0.16 mm. Esophagus short, bifurcating about midway between two suckers. Ceca narrow, terminating at posterior extremity. Acetabulum 0.19 – 0.5 mm in diameter, situated at second sixth of body.

Testes usually longer than wide, indented on each side, 0.29 – 0.9 × 0.17 – 0.53 mm, placed one immediately behind the other in middle third of body; the anterior may be wider than long in contracted examples, in which the posterior is, however, longer

than wide and may intrude into the posterior third of the body. The vas deferens arises from the pre-equatorial side of each testis; the right one passes along the left border of the ovary, and the left one dorsal to the uterine coils, both opening together into the vesicula seminalis at its posterior end. Vesicula seminalis subcylindrical, slightly curved, 0.13 – 0.33 mm long, 0.075 – 0.2 mm wide, extending from dorsolateral side of acetabulum to near ovary, from which it is separated by the receptaculum seminis, sharply constricted off from pars prostatica, which is cylindrical and measures about 0.1 mm long by 20 μ wide in the specimen 5.3 mm long. Prostate cells poorly developed around pars prostatica. Ductus hermaphroditicus shorter than half diameter of acetabulum. Genital pore immediately anterior to acetabulum.

Ovary subglobular, 0.1 – 0.28 × 0.1 – 0.25 mm, on the right of median line behind acetabulum. The germiduct arising from the dorsal posteromedial part of the ovary forms a bulbous dilatation before joining the receptaculum seminis and Laurer's canal, and then describing a U-shaped curve unites with the common vitelline duct coming from behind. Uterus coiling forward on left of ovary. Eggs oval, about 90 × 60 μ. Laurer's canal arising from the point where the germiduct joins the seminal receptacle, describing an S-shaped curve and opening dorsally sinistral to ovary. Shell gland well developed between ovary and anterior testis. Receptaculum seminis elongate saccular, extending along left border of ovary with its dilated anterior end 65 – 130 μ wide immediately in front of this organ. Vitelline follicles small, extending in lateral fields from behind acetabulum to posterior extremity, confluent in posttesticular field. They may commence at the genital pore, or at the level of the acetabulum on one side, and some follicles may form an isolated group around or on one side of the genital pore: the transverse vitelline ducts unite together immediately in front of the anterior testis without forming a definite reservoir.

Excretory vesicle tubular, with terminal pore, reaching to posterior end of hind testis, where the paired collecting vessels are given off. The lymph system as demonstrated by Manter for *Apocreadium mexicanum* and *A. longisinosum* has not been detected with certainty.

The present species resembles *A. balistis* Manter, 1947, and *A. mexicanum* more closely than *A. longisinosum*, but differs from

hem distinctly in egg size. The measurements of body size, uckers and eggs between the species in question and the Ameri- an representatives are shown in the following table.

	A. synagris	*A. mexicanum*	*A. longisinosum*	*A. balistis*
Body	2.3 – 5.3 × 0.4 – 1.05	2.15 – 4.1 × 0.75 – 1.1	6.57 – 9.65 × 1.55 – 2.4	3.73 × 0.62
Diameter of oral sucker	0.18 – 0.3	0.225 – 0.315	0.375 – 0.532	0.255
Diameter of acetabulum	0.19 – 0.5	0.352 – 0.502	0.675 – 0.885	0.35
Eggs	90 – 60 μ	61 – 67 × 31 – 34 μ	88 – 102 × 48 – 60 μ	73 – 78 × 49 μ

—OVER—

Apocreadium synagris Yamaguti, 1953

HOST: *Scolopsis margaritifer* (Pomadasyidae).
HABITAT: Small intestine.
LOCALITY: Jesselton, North Borneo.
DATE: 30 September 1960.
SPECIMENS: U.S.N.M. Helm. Coll. No. 60072 (two slides).

MEASUREMENTS AND SOME PERTINENT DATA (based on two specimens): Body 3,711 to 4,417 by 1,235 to 1,327; spines apparently lost; preoral body distinct, 13 to 22 long; forebody 690 to 958, hindbody 2,569 to 3,014, ratio 1 : 3.15 to 3.72; posttesticular space 1,618 to 1,779, ratio to hindbody 1 : 1.59 to 1.69; eyespot pigment scattered between oral sucker and acetabulum; oral sucker 291 to 305 by 305 to 318; acetabulum 445 to 452 by 468 to 498, at level of about anterior body fourth; sucker length ratio 1 : 1.46 to 1.55; prepharynx 46 to 95 long; pharynx 141 to 144 by 155 to 176, three-lobed in front; esophagus 74 to 99 long, cecal bifurcation 81 to 191 preacetabular, anterior testis 335 to 357 by 328 to 370, posterior testis 372 to 480 by 324 to 335; acetabulum to anterior testis 276 to 399, to posterior testis 522 to 744; vasa efferentia opening side by side into seminal vesicle; latter 213 to 276 by 122 to 150, extending 132 to 147 postacetabular to overrlap anteromedian part of ovary dorsally and midlength of seminal receptacle ventrally; ovary 246 to 283 by 283 to 296, 25 to 39 postacetabular; seminal receptacle 276 to 302 by 66 to 103, overlapping anteromedian part of ovary and posterior end of semina vesicle dorsally, Laurer's canal present; vitel laria commencing at level of posterior margi of acetabulum, confluent posttesticular; vitel line reservoir distinct, transversely elongate postovarian, 82 to 106 by 98 to 158, 8 partiall collapsed eggs measuring 85 to 93 by 55 t 68, lymph vessels conspicuous laterally an terior to vitellaria, hidden where latter present

DISCUSSION: Yamaguti (1953) described thi species from *Synagris taeniopterus* from Cel ebes. Our specimens showed a distinct pre oral body, a definite vitelline reservoir, and eyespot pigment, and the testes lacked latera indentations. Yamaguti indicated that the sem inal vesicle extended to near the ovary, being separated from the latter by the seminal recep tacle, whereas in our specimens the semina vesicle overlapped both the ovary and semina receptacle. Although Yamaguti noted and illus trated acetabular and preacetabular vitelline follicles in some specimens, he stated that i others the follicles commenced postacetabular Skrjabin (1959) reviewed the genus *Apo creadium* Manter, 1937, giving a key to the species which is not entirely workable for *A. synagris* inasmuch as it stated that the vitellaria commenced anterior to the acetab ulum or at its level.

FROM FISCHTHAL AND KUNTZ (1965)

Apocreadium **uroproctoferum**, sp. nov.[9]
Soganderes-Bernal, 1959

Host.—*Balistes vetula* Linn., queen triggerfish.

Location.—2/3 intestine.

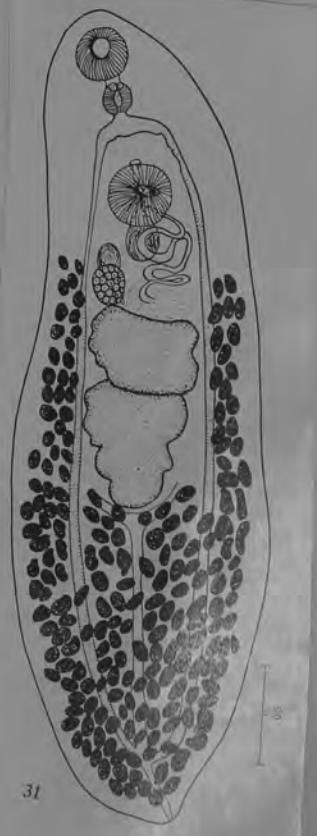
Locality.—N. Shore, N. Bimini, B.W.I.

Holotype.—U.S.N.M. Helm. Coll. No. 38867.

Diagnosis (based on 8 mature specimens).—Body lanceolate, widest at mid-posttesticular region, completely spined; 2.019 to 4.009 long by 0.270 to 1.045 wide at acetabular level and from 0.703 to 1.254 at widest point. Forebody 0.532 to 0.798 long. Hindbody 1.501 to 2.495 long. Oral sucker simple, subterminal, 0.181 to 0.248 long by 0.211 to 0.268 wide. Acetabulum at end of anterior fourth of body, recessed into body, 0.261 to 0.369 long by 0.268 to 0.362 wide. Sucker ratio 1:1.18 to 1.41. Prepharynx one-half to three-fourths length of pharynx. Anterior fourth of pharynx with a weak band of circular muscles, 0.141 to 0.181 long by 0.067 to 0.147 wide. Esophagus approximately one-fourth length of pharynx. Ceca ending in a uroproct a short distance from posterior end of body. Genital pore median, immediately preacetabular. Genital atrium extending from genital pore posteriorly dosal to anterior half of acetabulum. Testes equatorial, tandem, in contact or slightly overlapping each other; edges indented; anterior testis almost square, usually half length of posterior testis, 0.268 to 0.402 long by 0.215 to 0.567 long; posterior testis widest in its anterior region, tapering posteriorly rather sharply in some specimens to produce an almost triangular appearance, 0.318 to 0.643 long by 0.328 to 0.556 wide at its anterior end. Posttesticular space approximately equal with distance from anterior testis to anterior tip of body; 0.798 to 1.520 long. Seminal vesicle club-shaped, extending from genital atrium, dorsal to acetabulum, to near or in contact with ovary. Ovary globular, dextral, intercecal, usually in contact with anterior testis; 0.168 to 0.369 long by 0.141 to 0.261 wide. Mehlis' gland median, immediately anterior to anterior testis, posterior to ovary. Club-shaped seminal receptacle dorsal to ovary. Vitellaria extending from anterior edge of acetabulum or sometimes from level of ovary, mostly lateral to ceca, not confluent anterior to testes, filling posttesticular space. Uterus anterior to ootype, coiling a few times, to enter genital atrium at mid-acetabular level. Uncollapsed eggs 64 to 80 by 40 to 45 microns. Excretory vesicle Y-shaped, extending anteriorly from terminal excretory pore to posterior testis where it forks, sending one branch on each side of body, along inner border of ceca crossing ceca anterior to acetabulum, along outer borders of ceca, branching profusely at level of oral sucker; branches extending anterior to oral sucker. Lymphatic system present; vessels extending along inner side of ceca. A lymphatic sinus surrounding dorsal side of acetabulum, extending anteriorly at least as far as cecal bifurcation. One vessel (expecially visible in immature specimens) forks from main stem vessel at posterior end of body next to uroproct, curves outwards from main stem on each side of body to come in contact with each side of body at level of posterior testis.

Discussion.—This species differs from all others in the genus *Apocreadium* by possessing a uroproct but otherwise is a typical member of the genus. The presence of a uroproct is considered a generic character in certain Opecoelidae but not in the Acanthocolpidae (genus *Stephanostomum*). Among the species of *Apocreadium*, *A. uroproctoferum* has a relatively wide body.

[9] The name *uroproctoferum* indicates that the species bears a *uroproct*.



31

LOOSE LEAF
ORGANIZER

SCHEDULE

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APOCREADIUM

Barbulostomum Ramsey, 1965

Generic diagnosis of **Barbulostomum: Lepocreadiidae, Homalometroninae. Body elongate-lingoiform. Cuticle spined. Eyespot pigment present. Oral sucker subtriangular-cupuliform, ventrolateral edges with a pair of muscular papillae retractile into slit-like pouches. Acetabulum anterior to midlevel of body. Prepharynx and pharynx present, ceca bifurcating well anterior to acetabulum, terminating blindly near posterior end of body. Genital pore mesial, immediately preacetabular; genital atrium shallow. Testes two, tandem, intercecal, in posterior half of body. Seminal vesicle saccular. Ovary spherical, intercecal, pretesticular. Seminal receptacle present. Laurer's canal opening mesiodorsally. Uterus short, pretesticular, intercecal; eggs few, large, unembryonate. Vitelline follicles along sides of body posterior to acetabulum, filling posttesticular space. Excretory pore terminal; excretory vesicle tubular, not extending anterior to gonads.**

Type species: B. cupuloris, in sunfishes, Lake Pontchartrain, Louisiana.

The name *Barbulostomum* refers to the presence of papillae on the oral sucker. The name *cupuloris* indicates the chalice-like or cupuliform oral sucker.

DISCUSSION

Specimens from the type host and from *Lepomis punctatus* appeared to be the same species. The smallest subadult worm (lacking uterine eggs) was 1.10 mm long by 0.41 mm wide, and the largest 1.78 mm long by 0.40 mm wide.

The oral papillae were frequently retracted, especially in larger specimens, and often could be seen only under ideal optical conditions. Study of living and sectioned worms revealed that the papillae are protrusible from slit-like pockets in the ventrolateral edges of the oral sucker. They may project ventrad in life, as occasionally they were directed mesially in whole mounts. The characteristic cupuliform shape of the oral sucker and the presence of papillae distinguish *Barbulostomum* from *Homalometron* Stafford, 1904, one of the most closely related genera.

Stunkard (1964) reviewed the systematic status of the Homalometroninae. He included the genera *Homalometron* Stafford, 1904, *Microcreadium* Smith, 1929, *Crassicutis* Manter, 1936, *Postporus* Manter, 1949, and *Trematobrien* Dollfus, 1950. To these he should have added *Pancreadium* Manter, 1954 and *Dactylotrema* Bravo-Hollis and Manter, 1957, which were originally described as being related to *Homalometron*. The addition of the new genus *Barbulostomum* makes a total of eight genera in the Homalometroninae.

Although Manter (1962) indicated that *Trematobrien* is similar in some respects to *Crassicutis*, cuticular spines have yet to be demonstrated in the former genus. The species of *Crassicutis* have at least vestigial spines present on the ventral cuticle. *Trematobrien* is further unique among homalometronines in possessing fused ceca, and perhaps on this basis, and in combination with absence of cuticular spination, is deserving of placement with the Opecoeliidae.

The status of the genus *Creptotrema* Travassos, Artigas, and Pereira, 1928 awaits investigation. Manter (1962) indicated that if the type species, *Creptotrema creptotrema* Travassos, Artigas, and Pereira, 1928, proves to lack a cirrus sac, *Creptotrema* s. s. should be included in the Homalometroninae. Manter (1962) further indicated that the northern species *Creptotrema funduli* Mueller, 1934 is actually an opecoeliid related to *Plagioporus* Stafford, 1904, and should probably receive a new generic name.

Homalometron armatum (MacCallum, 1895) Manter, 1947 and *H. pallidum* Stafford, 1904 lack oral papillae. *Homalometron elongatum* Manter, 1947 was described as lacking papillae, but subsequent examination of paratypes revealed that the species possesses two lobes on the inner edges of the mouth, each of which bears three or four small papillae (Bravo-Hollis and Manter, 1957). Further examination of other specimens of *H. elongatum* from Bimini, B. W. I., demonstrated that the character of these papillae is constant. The generic status of *H. elongatum* needs investigation. The oral papillae in *Barbulostomum cupuloris* are perhaps homologous to those of *H. elongatum*, and are also similar in lateral position to the oral papillae of *Dactylotrema squamatum* Bravo-Hollis and Manter, 1957. *Barbulostomum* might be placed in an evolutionary sequence parallel to *Dactylotrema*, each probably having arisen from a predecessor similar to *Homalometron elongatum*.

Of five centrarchid fish species taken at the type locality of *B. cupuloris*, only *Lepomis microlophus* and *L. punctatus* were infected. Seven of 19 *L. microlophus* examined were infected with 1, 1, 2, 7, 15, 20, and 40 worms. Two of eight *L. punctatus* had one and four worms. Centrarchids found uninfected included two specimens each of *Lepomis symmetricus* Forbes, *Chaenobryttus gulosus* (Cuvier), and *Micropterus salmoides* (Lacepède).

Fourteen other fish species of marine and freshwater affinities from the same locality were uninfected by *B. cupuloris*. These represented the families Ariidae, Lepisosteidae, Engraulidae, Clupeidae, Cyprinidae, Belonidae, Syngnathidae, Cyprinodontidae, Poeciliidae, Mugilidae, Atherinidae, and Soleidae. The invertebrate fauna included many species typical of the brackish estuarine environment.

-OVER-

It is probable that *Barbulostomum cupuloris* has evolved in sunfishes through a host species with marine affinities. The homalometronines are noted for occurrence in both marine and freshwater hosts, even within the same genera (Manter, 1963).

Manter (1957) cited mugilid fishes (primarily marine, entering fresh water) as an example of a primary factor in the initial dispersal of trematodes of marine fishes into freshwater hosts. Shireman (1964) commented similarly on the zoogeographic significance of a haploporid described from mullet taken at the same type locality as the species [illegible] this paper. Lumsden (1963) provided [illegible] ditional link in Manter's "ecological bridge" theory (Manter, 1957) in describing another haploporid with distinctly marine affinities from the estuarine fish *Poecilia* (*Mollienesia*) *latipinna* (LeSueur).

The evolutionary stage of *B. cupuloris* apparently represents the penultimate stage in the "ecological bridge" sequence of dispersal into fishes of a strictly freshwater environment. While the sunfish hosts encountered here are members of a primary-division freshwater family (Myers, 1938), they are able to tolerate a low degree of salinity. *Barbulostomum cupuloris* infected *L. microlophus* and *L. punctatus* in the brackish lagoon, yet was absent from the same hosts from isolated freshwater ponds a few hundred yards from the lagoon. *Homalometron armatum* was taken from these hosts from the freshwater ponds, and is the apparent ecological replacement of *B. cupuloris*. *Homalometron armatum* was absent from fishes of the brackish lagoon, but specimens have been taken at this laboratory from freshwater drum, *Aplodinotus grunniens* Raf., from other parts of Lake Pontchartrain.

While further life-history study is definitely indicated, it might be surmised that *Barbulostomum cupuloris* is as yet dependent for completion of its life cycle on an intermediate host of the brackish estuarine environment. It is thus prevented at this stage from infecting sunfishes in nearby strictly freshwater habitats. The final step for completion of the series implicit in the "ecological bridge" theory would be total adaptation to the freshwater environment.

From Ramsey, 1965

***Barbulostomum cupuloris* gen. et sp. n.** RAMSEY, 1965

(Figs. 1, 2)

Hosts: *Lepomis microlophus* (Gunther), red-eared sunfish, type host; *L. punctatus miniatus* (Jordan), spotted sunfish.

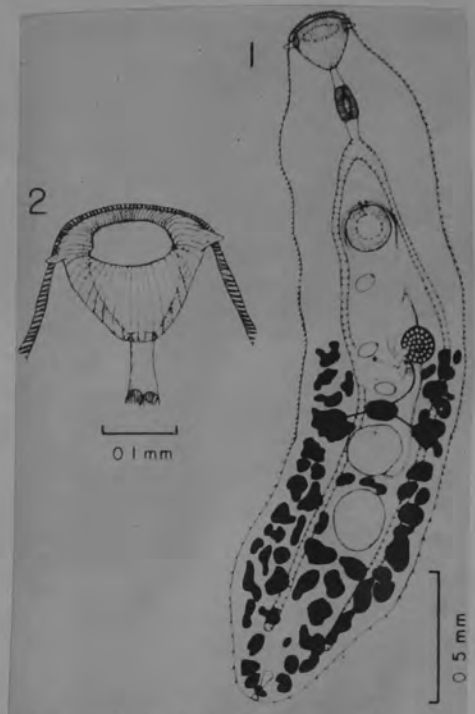
Location. Anterior half of intestine.

Locality: Brackish lagoon of Lake Pontchartrain, Bonnet Carré Spillway at Norco, St. Charles Parish, Louisiana.

Deposited: Holotype, USNM Helm. Coll. No. 61029, paratype No. 61030.

Diagnosis (based on 20 adult specimens from type host): Lepocreadiidae, Homalometrominae. Body elongate, linguiform, 1.68 to 4.57 mm long by 0.56 to 0.96 mm wide. Cuticle densely spined anteriorly; spines extending to posterior tip of body, less numerous on posterior third of body. Eyespot pigment diffuse in anterior ⅛ body. Oral sucker subterminal, cupuliform or subtriangular, with apex directed caudad; 184 to 260 long, by 179 to 250 wide; muscular papilla present on ventrolateral edge of sucker at each side of mouth, about 30 long when fully extended, retractile into slit-like pouches. Prepharynx 36 to 230 long. Pharynx 107 to 136 long by 71 to 107 wide. Esophagus shorter than or equal to pharynx in length. Ceca forking about midway between pharynx and acetabulum, extending almost to posterior end of body, ending blindly. Acetabulum rounded, in anterior third of body (further posteriad in smaller adults, including holotype), 153 to 240 long, by 173 to 257 wide. Sucker ratio 1 : 0.799 to 1.143 (mean 1 : 0.979).

Genital pore mesial, immediately preacetabular, followed by shallow genital atrium. Testes two, spherical, intercecal, tandem, in middle of hind body, 143 to 382 in diameter. Vasa efferentia extending anteriorly from testes, fusing short distance behind acetabulum to form short vas deferens which expands into simple sac-like seminal vesicle connecting with genital atrium. Ovary spherical, intercecal, dextral or mesial, about midway between acetabulum and anterior testis; diameter 117 to 216. Oviduct short, emerging from posterior or left side of ovary, connecting with small postovarian ootype which is surrounded by Mehlis' gland. Laurer's canal originating from oviduct, opening submesially on dorsum at level of ovary. Flask-shaped seminal receptacle originating from oviduct, base directed mesiodorsally and in advance of ovary. Vitelline follicles extending laterally from level of ovary to posterior end of body, overlapping ceca, usually intertesticular, filling posttesticular space; vitelline receptacle intercecal, between ovary and anterior testis, connecting with oviduct. Uterus originating at ootype, ascending intercecally, connecting with genital atrium. Uterine eggs few (1 to 9) light brown, 92 to 117 long by 58 to 82 wide (mean 103 by 70) with minute opercula, and lacking miracidia. Excretory vesicle tubular, extending from posterior excretory pore almost to posterior testis, main collecting tubules joining on either side of anterior end.



FIGURES 1, 2. *Barbulostomum cupuloris* gen. et sp. n. from sunfishes in Lake Pontchartrain. 1. Dorsal view of the holotype. 2. Detailed ventral view of the oral sucker.

BARBULOSTOMUM

Choanodera Manter, 1940

Generic diagnosis. — Apocreadiidae, Apocreadiinae: Body thick, elongate, yellow orange in life, spined. Lateral edges of forebody folded ventrad and meeting at posterior border of acetabulum, those of hindbody more or less crenulated. Oral sucker subterminal, followed by prepharynx. Pharynx small, esophagus short, ceca terminating blindly at posterior extremity. Acetabulum larger than oral sucker, in anterior half of body. Testes tandem, close together; anterior one equatorial. Seminal vesicle free, saccular, posterodorsal to acetabulum. Neither cirrus nor cirrus pouch. Pars prostatica surrounded by prostate cells, joining uterus to form tubular genital sinus or ductus hermaphroditicus. Genital pore at anterior edge of acetabulum. Ovary just medial to right cecum in front of anterior testis. Receptaculum seminis present. Uterus largely to left of ovary; eggs large, without filaments. Vitellaria in lateral fields of hindbody, confluent in posttesticular region. Excretory vesicle tubular, extending to posterior testis. Four longitudinal unbranched lymph vessels present. Parasitic in intestine of marine fishes.

Genotype: *C. caulolatili* Manter, 1940 (Pl. 15, Fig. 185), in *Caulolatilus anomalus* and *C.* sp.; Cerros Island, Mexico and James Island, Galapagos.

Allocreadiidae
~~Gyliauchenidae~~

GENERIC DIAGNOSIS OF CHOANODERA MANTER, 1940

Body thick, elongate, little tapering, spined, yellow orange. Forebody with edges folded ventrally and converging to meet at posterior edge of acetabulum. Acetabulum ¼ to ⅕ from anterior end, larger than oral sucker. Prepharynx, pharynx, esophagus present; ani lacking. Genital pore median. Testes tandem, close together. Seminal vesicle and prostate gland free in parenchyma; cirrus sac and cirrus lacking; tubular genital sinus present. Ovary pretesticular, to the right, ovoid, tapering toward one end; seminal receptacle, Mehlis' gland, and Laurer's canal all well developed. Uterus largely to left of ovary. Vitellaria well developed. Eggs large, thin shelled. Excretory vesicle to posterior testis with 2 pairs of anterior and one pair of posterior tubules. Four longitudinal, unbranched lymph vessels. Type species: *Choanodera caulolatili.*

The name *choanodera* is from *choan* (= funnel) and *dera* (= neck), and refers to the characteristic form of the forebody.

Comparisons. Choanodera is closely related to Apocreadium Manter, 1937. The ventrolateral folds of the forebody give a superficial resemblance to Bianium, which genus, however, is fundamentally different in possessing ani and a cirrus sac, and in lacking lymph vessels. Choanodera differs from Apocreadium in the characteristic folds of the forebody and in the unbranched lymph vessels. Body spines are better developed in Choanodera. The details of the reproductive system are practically identical in the two genera, differing only in specific characters.

The discovery of still another Allocreadid-like distome with lymphatic vessels increases the known number of such genera to five: namely, Petalocotyle, Megasolena, Hapladena, Apocreadium, and Choanodera. Carassotrema must be considered a related genus. This group of trematodes shows relationship to the amphistomes, on one hand, and to the Anallocreadiinae and Lepocreadiinae, on the other.

FROM: ALLAN HANCOCK PACIFIC EXPEDITIONS, VOL 2, No 14.

Choanodera caulolatili, ~~new genus, new species~~
(Plate 33, fig. 18) MANTER, 1940

Hosts: *Caulolatilus anomalus* (Cooper) (type host)
Caulolatilus sp.

Location: Intestine

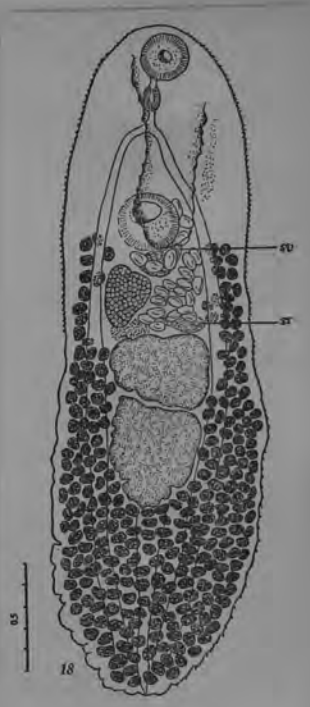
Localities: Cerros Island, Mexico (type locality)
James Island, Galapagos

Number: Many in each host

Allocreadiidae
GYLLANCHENIDAE ✓

SPECIFIC DIAGNOSIS OF CHOANODERA CAULOLATILI

The body is elongate, fairly thick, almost equally wide along most of its length, only slightly tapering and rounded or subtruncate at each end. In life, orange yellow in color. Size 2.565 to 3.307 by 0.945 to 1.282 (a specimen 1.40 long contained but one egg). The thick cuticula covered with scales or spines which are close together in the anterior part of the body but gradually becoming fewer until rather sparse near posterior end of body. Edges of the forebody folding in ventrally, separated anteriorly but converging posteriorly to meet just posterior to acetabulum. (This conspicuous and peculiar character gives the forebody the shape of a funnel flaring anteriorly but with its ventral side open. Sometimes the folds almost meet ventrally, forming a longitudinal slit along the length of the forebody. Under pressure the folds may be flattened out laterally to form an expansion of the forebody.) Oral sucker subterminal, round, 0.165 to 0.225 in diameter; acetabulum subcircular, often slightly wider than long, 0.262 to 0.337 in diameter, its aperture usually wider than long. Forebody ¼ to ⅕ body length. Prepharynx short, often extending down over anterior part of pharynx; pharynx unmodified, usually somewhat longer than wide but of variable proportions, 0.104 to 0.127 in length by 0.078 to 0.141 in width; esophagus very short and surrounded by gland cells; intestinal bifurcation approximately midway between suckers; ceca extending to near posterior end of the body where each ends blindly. Genital pore median at anterior edge of acetabulum. Testes tandem, close together, smooth or with slightly crenulated border, extending between the ceca; anterior testis about at midbody level. Testes somewhat variable, especially the anterior testis, usually wider than long. They are sometimes subequal in size, but either one may be considerably larger than the other. Posttesticular space from slightly to considerably longer than forebody length. Seminal vesicle an ovoid sac just posterior to and partly overlapping the acetabulum, narrowing (dorsal to acetabulum) to a tubular pars prostatica surrounded by a well-developed prostate gland. Just anterior to the middle of the acetabulum the tube bends ventrally and is joined by the uterus to form a tubular genital sinus or ductus hermaphroditicus. Cirrus and cirrus sac lacking.



Ovary a short distance anterior to the anterior testis and to the right of midline, just median to the right cecum, about halfway between anterior testis and acetabulum, without distinct lobes and almost always somewhat extended in a diagonal direction. Since it is somewhat broader at one end, it assumes a heartlike shape tipped at varying angles. Mehlis' gland large, between ovary and anterior testis. Laurer's canal very large with thick walls, opening dorsally and medianly opposite the ovary. Uterus pretesticular but chiefly to the left of the ovary, becoming a straight, narrow tube dorsal to acetabulum where it joins the male duct. Large flask-shaped seminal receptacle to left of ovary or, more often, between ovary and acetabulum. Vitelline follicles large, extending from near posterior edge of the acetabulum to posterior end of body. (Anteriorly they may almost reach mid-acetabular level.) They are lateral, dorsal, and ventral to ceca and are confluent posterior to the testes. Eggs thin shelled, variable in size, 87 to 102 by 48 to 65 μ, usually 92 to 100 by 50 to 60 μ.

Excretory pore terminal; excretory vesicle extending to posterior testis where it forks into 2 tubules. The tubule on each side soon becomes double. A single pair of smaller tubules extends to near the posterior end of the body. Lymphatic vessels present. Four longitudinal vessels close to intestinal ceca can be seen at most body levels. One pair of these vessels extends dorsal to oral sucker. Anterior to the middle of the body the vessels are inconspicuous and often cannot be seen probably because in a collapsed state. The lymph vessels show no sign of branching.

FROM: ALLAN HANCOCK
PACIFIC EXPEDITIONS,
VOL. 2, NO. 14.

CHOANODERA

LOOSE LEAF
ORGANIZER

SCHEDULE

PERIOD OR TIME								
COURSE MON. INSTRUCTOR								
COURSE TUE. INSTRUCTOR								
COURSE WED. INSTRUCTOR								
COURSE THU. INSTRUCTOR								
COURSE FRI. INSTRUCTOR								
COURSE SAT. INSTRUCTOR								

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Crassicutis Manter, 1936

Generic diagnosis. — Allocreadiidae, Homalometrinae: Body medium-sized, flattened oval. Cuticle very thick, smooth except for rudimentary spines which are embedded in the cuticle of the ventral surface. Oral sucker large, prepharynx present. Pharynx well developed, esophagus short, ceca removed from body sides, reaching to near posterior extremity. Acetabulum not very large, pre-equatorial. Testes obliquely juxtaposed between two ceca, postequatorial. Vesicula seminalis free, extending a short distance posterior to acetabulum. No cirrus pouch. Genital pore median, just pre-acetabular. Ovary submedian, between acetabulum and right testis. Receptaculum seminis and Laurer's canal present. Uterus winding between testes and genital atrium, containing few large eggs. Vitellaria occupying most of body posterior to pharynx except for region of gonads and peripheral area. Excretory vesicle reaching to testes, with dorsal opening. Parasitic in digestive tract of fishes.

Genotype: *C. cichlasomae* Manter, 1936 (Pl. 12, Fig. 149), in stomach of *Cichlasoma mayorum;* Yucatan.

Other species: *C. marina* Manter, 1947, in *Eucinostomus lefroyi* and *Garres cinereus;* Florida.

Manter (1936) originally separated members of his genus from those of *Homalometron* Stafford 1904 because they lacked both cuticular spines and a prostate gland. Later (1947), he separated them on the basis of "absence of body spines, very thick cuticula, and perhaps also, the anteriorly confluent vitellaria." Even though we now know of some intergradation in characters such as the presence of a few spines in large *C. gerridis* Nahhas and Cable 1964 and their suspected loss in *C. karwarensis* Hafeezullah 1970, as well as relatively thick teguments in some species of *Homalometron*, many characteristics of *Crassicutis* spp. relate more to species of *Apocreadium* Manter 1937 than to those of *Homalometron*. Several species such as *A. foliatum* (Siddiqi and Cable 1960) Overstreet 1969 (=*Homalometron f.*) have a thick tegument and *A. longisinosum* Manter 1937 and *A. cryptum* Overstreet 1969 lack tegumental spines. Several species possess features more specific to *C. archosargi* such as *A. mexicanum* Manter 1937, which lacks complete large vitelline follicles ventral to the ceca as apparently does *C. cichlasomae* Manter 1936, *C. opisthoseminis* Bravo-Hollis and Arroyo 1962, and *C. chuscoi* (Pearse 1920) Peters 1957; *A. longisinosum* and others which are yellowish-orange in life as is *C. bravoae* Jimenez and Caballero 1974; and *A. foliatum*, *A. cryptum*, *A. manteri* Overstreet 1970, and *A. caballeroi* Bravo-Hollis 1954, which have dorsal subterminal excretory pores as do *C. cichlasomae* and *C. opisthoseminis*. Members of *Apocreadium* are separated from those of *Neoapocreadium* Siddiqi and Cable 1960 on the basis of not possessing vitelline follicles confluent in the forebody. Other characters have been suggested as means of separating the species by Sogandares-Bernal (1959), Siddiqi and Cable (1960), and Yamaguti (1971), but reexamination of specimens and inclusion of additional species nullify those differences.

Members of both *Apocreadium* and *Neoapocreadium* differ from those of *Crassicutis* and *Homalometron*, which also can be separated from each other by the anterior extent of vitelline follicles, because they possess a lymphatic system. That difference was instrumental in Yamaguti's (1971 and earlier works) decision to consider Apocreadiidae separate from Homalometridae. Discerning the lymphatic system presents difficulties for some species (Overstreet, 1970), and I do not consider its presence or absence in the "lepocreadiids" as listed by Howell (1966) significant enough to delineate families. In *C. archosargi*, where none exists, the ducts transporting vitelline material and membranes surrounding follicular bunches resemble a lymphatic system when not filled with compact material, especially in living material kept in saline for long periods.

In addition to all the above characters which cast doubt on Yamaguti's taxonomic arrangements, some other features of species of *Crassicutis* present problems. *Crassicutis cichlasomae*, the type-species, was originally described with diagonal testes and lacking a prostate gland. With the exception of *C. chuscoi*, *C. opisthoseminis*, and apparently *C. bravoae*, other species all have tandem testes. The related *Pancreadium otagoensis* Manter 1954 also has diagonal testes, but its excretory vesicle winds between them, and the ovary is deeply lobed. In *Trematobrien haplochromios* Dollfus 1950, which was shown by Manter (1962) to lack a cirrus sac, the testes are symmetrical, but the ceca unite posteriorly. *Crassicutis chuscoi*, *C. wallini* (Pearse 1920) Peters 1957, *C. gerridis*, my specimen (Overstreet, 1969) of *C. marina* Manter 1947, and possibly others all have some prostatic cells. Yamaguti (1971), on the basis of the extent of the seminal vesicle, position of the genital pore, and number and size of eggs, removed *C. antarcticus* Szidat and Graefe 1967 from the genus without transferring it to another genus. Because of the incomplete description of that species, I believe types or additional material need to be examined before the species is treated further. In order for a proper review of *Crassicutis*, redescriptions of many species described in that and related genera are necessary.

UNIDENTIFIED REFRACTILE BODIES

Spherical-, subspherical-, and irregularly-shaped refractile bodies, up to 20 μm in diameter but averaging about 5 μm were conspicuous in some living and mounted specimens. These bodies were most concentrated in the tegument and acetabular tissue (Fig. 4) and less conspicuous in the parenchyma. Heidenhain's iron hematoxylin revealed most of them to possess a clear crystalline internal region (Fig. 5), but a few showed a darkly stained internal region or ring.

Various histochemical tests of the bodies ruled out several components: collagen (Masson's trichrome method and Mallory's phosphotungstic acid hematoxylin method [PTAH]); keratin (Ayoub-Shklar method); calcium (Kossa's method); and iron (Lillie's method for ferric and ferrous iron). The use of McManus' method for glycogen (PAS), the modification of Mowry's 1958 colloidal iron stain for acid mucopolysaccharides, and May-Grunwald Giemsa method also failed to reveal an identifiable component.

The central portion, however, contained material which polarized light as shown with Nicol prisms. This birefringence was most conspicuous using sections stained with Lillie's

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method for ferric and ferrous iron, but also apparent using Heidenhain's iron hematoxylin and Kossa's method for calcium. Some stains caused the apparent complete disappearance of the polarizing material.

All worms did not possess the refractile bodies. Only worms in a single fish, collected 15 November 1974, harbored the structures, and then only in about 15 of over 100 examined worms. No obvious relationship existed between the bodies and myxosporidan infections.

The function of the bodies is unknown. Because they appeared in few individuals from only one fish, they may be a pathological condition resulting from a host-parasite interaction which originated from a metabolic alteration of that particular host fish or sub-population of *C. archosargi*. Their cytoplasmic location, shape, and birefringence (Missmahl and Riethmüller, 1967) support an interpretation of being lysosomes, but the bodies measure larger than expected for such structures. Fresh material could not be obtained to investigate for enzymatic properties of these organelles.

On a few occasions, I have observed the same or similar appearing bodies in a few other species of digeneans, but never in as many individuals or in such dense concentrations.

HOST-PARASITE INTERFACE

Binding some medium-sized trematodes to their host was a tegument with most remarkable adhesive qualities, making mechanical removal from the host's intestinal epithelium difficult. Worms from a few different fish showed this capability, and presumably any-sized worm could attach in a similar manner even though large worms did not occur in examined fish with adhering worms. Small worms observed in such fish, however, attached solely by their two powerful suckers. The unusual tegumental attachment by the medium-sized worms required sectioning of these specimens *in situ* (Figs. 6–9).

The attaching tegument contrasted sharply in appearance and staining capacity with the unmodified, unattached tegument of the same worm. A substance histologically appearing as a modified syncytial tegument usually comprised the complete distance between the host's epithelial tissue and the worm-proper, often a thickness over five times that of the unmodified tegument. In addition to filling most of the available space between host and worm-proper, this modified tegument cemented many of the host's intestinal crypts together. Usually the ventral side of the worm attached to the host with the acetabulum withdrawn. Attachment along lateral portions of the worm was observed (Fig. 8); presumably any tegumental area, given the proper stimulus, could bind with the host. The modified tegument, as opposed to the remaining unmodified portion, stained positive with the PAS stain both with and without diastase digestion, indicating the presence of material other than glycogen (Figs. 7, 9). Mayers' mucicarmine stain ruled out its composition by mucin, and Gomori's stain indicated the absence of reticulum. No acid mucopolysaccharides were evident in the tegument using the modification of Mowry's 1958 colloidal iron stain, and the PTAH stain failed to reveal fibrin. Both the modified and unmodified tegument took up the eosin from Harris' hematoxylin and eosin stain (Figs. 6, 8), and neither polarized light. In addition to the tinctorial differences between the two portions shown with PAS stain, Masson's trichrome stain also provided a striking difference. The complete thickness of the modified tegument selectively stained with the aniline blue dye.

Immediately underlying the tegument within the parenchyma occurred a birefringent interrupted band. Similar birefringent material also lined the worm's alimentary tract and oral cavity. The disjunct band completely encircled the worm, exhibiting no specific relationship to the modified tegument; it was not collagen or keratin. Preparations stained with Harris' H and E showed the feature intensely with polarization microscopy. Birefringent material among muscle tissue of the pharynx was also evident with Harris' H and E and with diastase-digested sections stained using the PAS method. Birefringent features are already known to characterize various helminths (Wolman, 1975).

Despite the lack of complete histological characterization of the modified tegument, a description of the unique structure deserved attention. The different mode can now be added to the more understood mechanisms of attachment. Various trematodes attach to their hosts by one or more suckers, glands of different types, a strigeoid adhesive organ, modifications of their bodies into cup-like structures, lodgment in host tissue, hooks, spines, and an unusual relationship with the host as described by Leigh (1963). Leigh found that *Odhneriotrema incommodum* (Leidy 1856) attached to its alligator host in such a way that the tegument of the parasite disappeared at the anterior point of contact, the host's adjacent mucosa became destroyed, and interdigitation appeared to occur between host and parasitic tissues.

Erasmus (1972:248), who studied the intimate relationship between tegument and host of strigeoids, pointed out that local specialization of the tegument can occur. Indeed, a reappraisal of host-parasite interfaces, as he suggested, now appears more necessary, even though the generalized tegumental attachment of *C. archosargi* is far from universal. Lumsden (1975:297), in his extensive review of helminth surfaces, pointed out that the superficially positioned coat of a digenean tegumental surface varies considerably in morphology and chemistry between different developmental stages of the same species and between comparable stages of different species. The tegument and its surface of *C. archosargi* may

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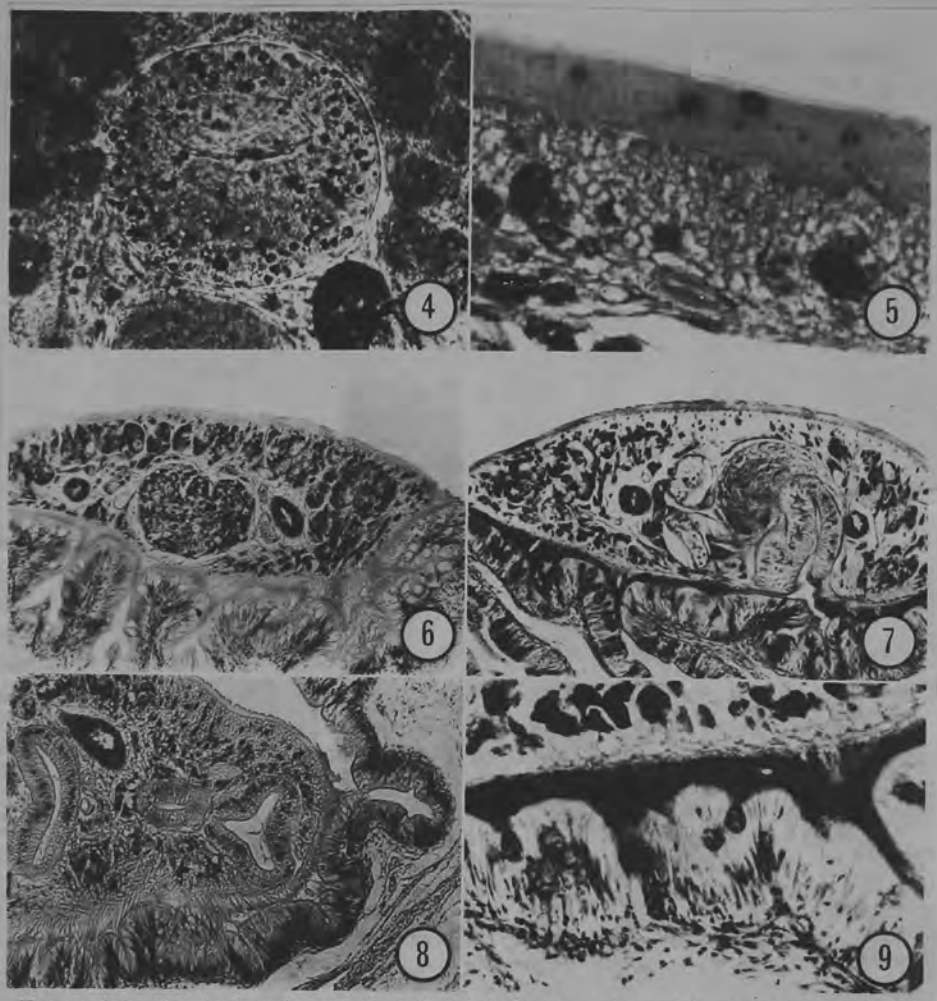
DISCUSSION from Overstreet's (1976) paper on Crassicutis (continued).



FIGURES 4–9. *Crassicutis archosargi*. **4.** Refractile bodies situated in and about acetabulum of whole mount, Van Cleave's hematoxylin, × 170. **5.** Sectioned material showing stained refractile bodies in dorsal tegument, Heidenhain's iron hematoxylin, × 500. **6.** Cross section at testicular level showing modified tegument attached to host's intestinal epithelium, Harris' hematoxylin and eosin, × 96. **7.** Cross section at acetabular level of same worm, stained by PAS method and digested with diastase, × 94. **8.** Frontal view showing lateral attachment, Harris' hematoxylin and eosin, × 94. **9.** Close-up of similarly stained material as in Fig. 7, × 300.

provide an important source and tool in understanding variability in composition of a tegument of an adult worm involved with a shift in its functions and, even more important, in recognizing an important biologically adhesive material. Possible functions of the interface other than attachment were not investigated.

PROTOZOANS

Both heavy and light infections of a myxosporidan occur in tissues of the digenean. Because the parasite represents an undescribed species and because an invertebrate acts as such an unusual host, a separate paper will treat it (Overstreet, 1976).

A symbiotic flagellate identified as *Hexamita* sp. occurred within the ceca of several individuals. Most conspicuous in small worms, the pyriform protozoan measured about 6 to 7 μm long by 4 μm wide when alive, not counting its flagella. The flagella extended about the length of the body proper. When fixed, the body retained similar dimensions (4 to 7 by 3 to 4 μm), but acquired a more ellipsoidal shape. Under stress of microscopic examination, many attached their anterior ends to the trematode's intestinal epithelia and assumed an amorphous shape, sometimes with long filamentous adhesive projections.

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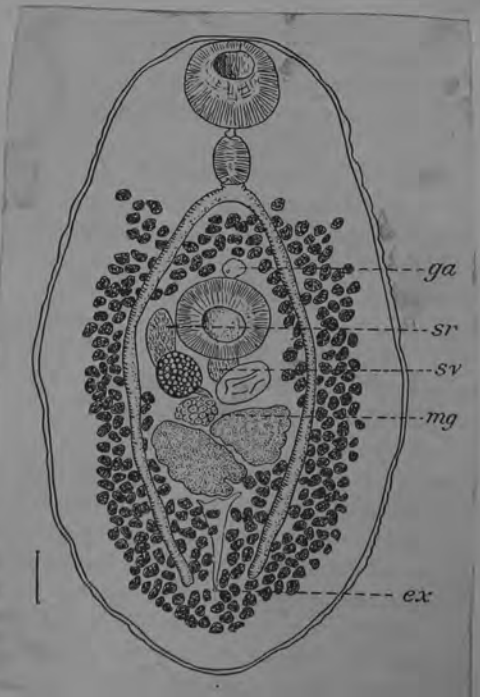
Another species of *Hexamita* Dujardin from a trematode has been reported (Hunninen and Wichterman, 1936; 1938). Measuring 8 to 14 μm long by 3 to 7 μm wide, that flagellate infected the eggs, uterus, oviducts, seminal receptacle, vitelline glands, and testes of *Deropristis inflata* (Molin 1859) Odhner 1902 (Acanthocolpidae) in an eel from Woods Hole, Massachusetts. It inhabited trematodes in 20 of 35 fish with the worm, but not in two other digeneans in the eel nor in the fish's intestine, except in rare cases when feces contained heavily-infected eggs. Over 20 individuals could infect a single egg and infected eggs did not develop miracidia. Manter (1930) observed protozoans from the ceca of *Lepocreadium trulla* (Linton 1907) Linton 1910 (Lepocreadiidae) from a yellowtail snapper "about the size and shape of *Chilomastix*." He did not see flagella on the active organisms, but did encounter the protozoan on different occasions. In fixed specimens of *Bancroftrema neoceratodi* Angel 1966 (Paramphistomidae) from *Neoceratodus forsteri* (Krefft), Angel (1966) observed between a few and 60 organisms in the ceca of all immature, but not mature, specimens examined. She assumed these 10.5 μm by 7 μm individuals to be a flagellate with its symbiotic status uncertain.

From Overstreet, 1976

CRASSICUTIS Manter, 1936

Medium-sized Allocreadiidæ of somewhat flattened broad body, rounded at each end. Cuticula very thick, smooth except for rudimentary spines embedded in the cuticula of the ventral surface. Oral sucker sub-terminal, ventral sucker just posterior to first body third. Short prepharynx, well-developed pharynx, short esophagus, narrow ceca distant from sides of body ending a short distance anterior to posterior end. Genital pore median, at anterior border of ventral sucker. Testes slightly lobed, diagonal, intercecal, just posterior to mid-body. Seminal vesicle an elongate sac extending a short distance posterior to ventral sucker; prostate gland, cirrus, and cirrus sac lacking; short genital atrium present. Ovary spherical at right posterior border of ventral sucker, yolk reservoir, Laurer's canal and seminal receptacle present; uterus short, mostly dorsal to the ventral sucker; eggs large, few, thin-shelled. Vitellaria well developed, not reaching sides of body, filling most of body posterior to pharynx, except for region of the genital organs and the peripheral region. Excretory pore dorsal, in advance of posterior tip; excretory vesicle a short unbranched tube. Type species: *Crassicutis cichlasomæ*.

The classification of *Anallocreadium* and *Crassicutis* is not entirely evident. Simer (1929, 139) recognized the difficulty of assigning *Anallocreadium* to a sub-family because of the absence of a cirrus sac. Largely on this same character, Hunter and Bangham (1932, 139) establish the subfamily Anallocreadiinæ. There is some question as to the subfamily significance of the absence of the cirrus sac. The genera *Anallocreadium* and *Crassicutis* show affinities to the Lepocreadiinæ through the genus *Homalometron* Stafford, a trematode of brackish-water fish which possesses a spiny cuticula, median genital pore and no cirrus sac, although a prostate gland is present. In fact, the genus *Homalometron* seems to the author to agree almost perfectly with the genus *Anallocreadium*. Further evidence of relationship to the Lepocreadiinae is to be sought in life history studies. The genus *Æphnidiogenes* Nicoll, 1915, was described as lacking a cirrus sac. Yamaguti (1934, 341), however, describes a cirrus sac as present. The genus would thus fall logically into the subfamily Lepocreadiinæ. Yamaguti's new subfamily Æphnidiogenetinæ does not seem to me to be justified.



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The genus *Crassicutis* is another member of the subfamily Homalometroninae. The genus was named by Manter (1936) for *C. cichlasomae* from *Cichlasoma mayorum* in Yucatan. Other species now known are *C. chuscoi* (Pearse, 1920) Peters, 1957; *C. wallini* (Pearse, 1920) Peters, 1957 from a characid and a cichlid fish respectively in Venezuela; *C. marina* Manter, 1947; and *C. archosargii* Sparks & Thatcher, 1960 from marine fishes in the Gulf of Mexico.

FROM MANTER, 1962

Crassicutis Manter, 1936

Medium-sized Allocreadiidæ of somewhat flattened broad body, rounded at each end. Cuticula very thick, smooth except for rudimentary spines embedded in the cuticula of the ventral surface. Oral sucker sub-terminal, ventral sucker just posterior to first body third. Short prepharynx, well-developed pharynx, short esophagus, narrow ceca distant from sides of body ending a short distance anterior to posterior end. Genital pore median, at anterior border of ventral sucker. Testes slightly lobed, diagonal, intercecal, just posterior to mid-body. Seminal vesicle an elongate sac extending a short distance posterior to ventral sucker; prostate gland, cirrus, and cirrus sac lacking; short genital atrium present. Ovary spherical at right posterior border of ventral sucker, yolk reservoir, Laurer's canal and seminal receptacle present; uterus short, mostly dorsal to the ventral sucker; eggs large, few, thin-shelled. Vitellaria well developed, not reaching sides of body, filling most of body posterior to pharynx, except for region of the genital organs and the peripheral region. Excretory pore dorsal, in advance of posterior tip; excretory vesicle a short unbranched tube. Type species: *Crassicutis cichlasomæ*.

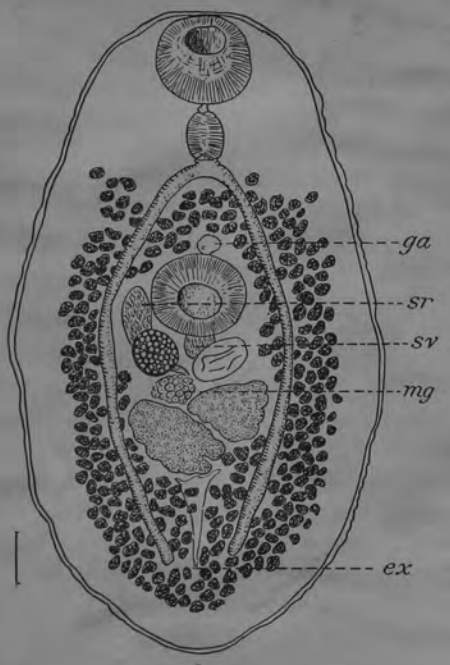

FIG. 1—Ventral view of *Crassicutis cichlasomæ*.

Fig. 2. Distribución geográfica del género *Crassicutis* Manter, 1936.
c= *C. cichlasomae;* w= *C. wallini;* u *C. chuscoi;*
o= *C. opisthoseminis;* b *C. bravoae;* m *C. marina;*
a= *C. archosargii;* g *C. gerridis;* k *C. karwarensis.*

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TABLA No. 2

CUADRO COMPARATIVO DE LAS ESPECIES DEL GENERO *CRASSICUTIS* MANTER, 1936

ESPECIE	*C. cichlasomae*	*C. wallini*	*C. chuscoi*	*C. opisthoseminis*	*C. bravoae*	*C. marina*	*C. gerridis*	*C. karwarensis*	*C. archosargii*
DISTRIBUCION GEOGRAFICA	Yucatán, México, Costa Rica, Cuba.	Lago Valencia, Venezuela.	Lago Valencia, Venezuela.	Guanacaste, Costa Rica.	Nuevo León, México.	Florida, U. S. A. Jamaica. Curacao.	Curacao. Jamaica.	Karwar, India.	Louisiana, U. S. A. Texas, U. S. A.
HOSPEDEROS	*Cichlasoma meeki*orum *C. tetracantha Cichlasoma* sp.	*Cremicichla geayi*	*Aquidens pulcher*	*Cichlasoma* sp.	*Cichlasoma cyanoguttatus cyanoguttatus*	*Eucinostomus lefroyi E. gula Gerres cinereus*	*Gerres cinereus*	*Gerres filamentosus*	*Archosargus probatocephalus*
FAMILIA DEL HOSPEDERO	Cichlidae	Cichlidae	Cichlidae	Cichlidae	Cichlidae	Gerresidae	Gerresidae	Gerresidae	Sparidae
HABITAT DEL HOSPEDERO	Dulceacuícola	Dulceacuícola	Dulceacuícola	Dulceacuícola	Dulceacuícola	Marino	Marino	Marino	Marino
LOCALIZACION DENTRO DEL HOSPEDERO	Estómago e intestino	Intestino	Intestino	Intestino	Estómago e intestino	Intestino	Intestino	Intestino	Intestino
FORMA DEL CUERPO	Oval	Oval	Oval	Oval	Oval	Lingüiforme	Lingüiforme	Lingüiforme	Lingüiforme
VENTOSAS	Iguales	Iguales	Desiguales	Iguales	Iguales	Desiguales	Desiguales	Desiguales	Desiguales
TESTICULOS	Oblicuos	Paralelos longitudinalmente	Oblicuos	Paralelos longitudinalmente	Paralelos longitudinalmente	Paralelos longitudinalmente	Paralelos longitudinalmente	Paralelos longitudinalmente	Paralelos longitudinalmente
RECEPTACULO SEMINAL	Preovárico	Preovárico	Preovárico	Postovárico	Preovárico	Preovárico	Preovárico	Preovárico	Preovárico
FOLICULOS VITELINOS POR ENCIMA DEL NIVEL ANTERIOR DEL ACETABULO	Extracecales, cecales, ocupan totalmente el área intercecal	Extracecales	Extracecales	Extracecales, cecales, ocupan totalmente el área intercecal	Extracecales y cecales	Extracecales y cecales. Se inician por arriba del nivel anterior de la Faringe	Extracecales, cecales, ocupan totalmente el área intercecal. Se inician por arriba del nivel anterior de la Faringe	Extracecales y cecales. Se inician por debajo del nivel de la Faringe	Extracecales, cecales, ocupan totalmente el área intercecal. Se inician por debajo del nivel de la Faringe

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CLAVE PARA LAS ESPECIES DEL GENERO *CRASSICUTIS* MANTER, 1936

A.—Parásitos en peces de agua dulce. Forma del cuerpo oval. Testículos opuestos, oblícuos o uno detrás del otro.

a).—Receptáculo seminal preovárico.

1.—Acetábulo pequeño sin ocupar totalmente el espacio intercecal. Vesicula seminal a un lado del acetábulo.

i).—Testículos opuestos o ligeramente oblícuos. Los folículos vitelinos ocupan totalmente el espacio entre la bifurcación intestinal y el acetábulo — — — — — — — — — — — — — — — — *C. cichlasomae* Manter, 1936.

ii).—Testículos uno detrás del otro. Los folículos vitelinos no ocupan el espacio entre la bifurcación intestinal y y el acetábulo — — — — — — — — *C. bravoae* n. sp.

2.—Acetábulo grande, ocupa totalmente el espacio intercecal. Vesícula seminal sobre la línea media del cuerpo.

i).—Testículos opuestos o ligeramente oblícuos. Vitelógenas extracecales. Poro reproductor sobre la línea media del cuerpo — — — — — — — — — — — — *C. chuscoi* (Pearse, 1920) Peters, 1957.

ii).—Testículos uno detrás del otro. Vitelógenas cecales, inter y extracecales. Poro reproductor a un lado de la línea media del cuerpo — — — — — — — — *C. wallini* (Pearse, 1920) Peters, 1957.

b).—Receptáculo seminal postovárico.

1.—Poro reproductor a un lado de la línea media del cuerpo — — — — — — — — — — — — — — — — *C. opisthoseminis* Bravo et Arroyo, 1962.

B.—Parásitos de peces marinos. Forma del cuerpo lingüiforme. Testículos uno detrás del otro.

a).—Glándulas vitelógenas iniciándose por arriba del nivel anterior de la faringe.

1.—Acetábulo, más grande que la ventosa oral. Folículos vitelinos sin ocupar el espacio entre la bifurcación intestinal y el acetábulo — — — — — — — — — *C. marina* Manter 1947.

2.—Acetábulo ligeramente mayor que la ventosa oral. Folículos vitelinos, ocupan totalmente el espacio entre la bifurcación intestinal y el acetábulo — — — — — — — — — *C. gerridis* Nahhas et Cable, 1964.

b).—Glándulas vitelógenas iniciándose por debajo del nivel de la faringe.

1.—Acetábulo, más pequeño que la ventosa oral, situado en el primer tercio anterior del cuerpo — — — — — — — — — — — — *C. archosargii* Sparks et Thatcher, 1960.

2.—Acetábulo, más grande que la ventosa oral, situado por encima del ecuador del cuerpo — — — — — — — — — — — — *C. karwarensis* Hafeezullah, 1970.

JIMINEZ G. AND CABALLERO y C., 1974

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DISCUSION: El género *Crassicutis* fue creado por Manter (1936) para incluir una nueva especie de trematodo *C. cichlasomae*, que encontró en el estómago de un pez dulceacuicola *Cichlasoma mayorum* Hubbs, procedente del Cenote Xtoloc, Chichén Itza, Yucatán, México y colocando este género dentro de la familia Allocreadiidae Stossich, 1903; Skrjabin (1960) lo incluye dentro de la familia Lepocreadiidae Nicoll, 1935; mas tarde el mismo Manter (1947) en un estudio de los trematodos digéneos de peces marinos, colectados en Tortugas, Florida, U. S. A., describe *C. marina* que aisla del intestino de dos hospederos, *Eucinostomus lefrovi* (Goode) y *Gerres cinereus* (Walbaum). Peters (1957) en su análisis del género *Allocreadium* Looss, 1900, coloca las especies *Allocreadium wallini* de intestino de *Crenicichla geayi* y *Allocreadium chuscoi* del intestino de *Aquidens pulcher* Gill en el género *Crassicutis;* estos trematodos fueron encontrados inicialmente por Pearse (1920) en peces de agua dulce del Lago de Valencia, Venezuela. Sparks y Thatcher (1960) describen *C. archosargii* del intestino medio de un pez marino *Archosargus probatocephalus* procedente de Grand Isle, Louisiana, U. S. A., Bravo-Hollis y Arroyo (1962) estudiando los trematodos digéneos de peces de agua dulce de Costa Rica, encuentran en el intestino de *Cichlasoma* sp. colectadas en Quebrada Grande, Liberia, Provincia de Guanacaste, dos especies de *Crassicutis* identificados como *C. cichlasomae* Manter, 1936 y *C. opisthoseminis*, esta última descrita como nueva. Manter (1962) afirma la validez de *C. chuscoi* (Pearse, 1920) Peters, 1957 y *C. wallini* (Pearse, 1920) Peters, 1957. Nahhas y Cable (1964) estudiando los trematodos que parasitan peces marinos de Curacao y Jamaica, colectan *C. marina* Manter, 1947 y describen una nueva especie *C. gerridis*, ambos aislados del intestino de *Gerres cinereus*. Szidat y Graefe (1967) al estudiar los parásitos de un pez antártico *Parachaenichthys charcoti* colectados en bahía Luna de las islas Shetland del Sur, describen muy brevemente una especie nueva de trematodo encontrado en los apéndices e intestino anterior como *C. antarcticus*, criterio que no compartimos; pues pensamos se trate de otro género, por la posición de la vesícula seminal y el ovario. Overstreet (1969) en su estudio de los trematodos digéneos de peces marinos, amplia la distribución de *C. marina* Manter 1947 al encontrarla en el intestino medio de *Eucinostomus gula* colectado en Biscayne Bay, Florida, U. S. A., Hafeezullah (1970) describe una nueva especie, *C. karwarensis* aislada del intestino de un pez marino *Gerres filamentosus* Cuv. colectado en Karwar, India. Moravec y Barus (1971) reportan a *C. cichlasomae* Manter, 1936 en el intestino de un pez de agua dulce *Cichlasoma tetracantha* (Cuvier et Valenciennes) colectada en las provincias de Pinar del Rio, Habana y Las Villas, Cuba. Joy (1971) amplia la distribución de *C. archosargii* Sparks et Thatcher, 1960 aislado de *Archosargus probatocephalus* en las costas de Texas, U. S. A., y elabora una relación de la distribución geográfica del género *Crassicutis*. Por último Yamaguti (1971) pone en duda la posición sistemática de *C. antarcticus* Szidat et Graefe, 1967 sin resolver el taxón.

Allocreadiidae

Analocreadiinae

Crassicutis cichlasomæ n. gen., n. sp. Manter, 1936

(Fig. 1)

Two mature and three immature specimens were collected from the stomach of *Cichlasoma mayorum* Hubbs at the Xtoloc Cenote, Chichen Itza. These trematodes proved to be allocreadids related to *Anallocreadium* Simer, 1929. Their position in the stomach is unusual since Allocreadiidæ are typically intestinal forms. That the stomach may be the normal habitat, however, is indicated by the extremely thick cuticula of the trematodes, a character not typical for the family.

The body form is oval in outline, broadly rounded at each end, very slightly more narrowed anteriorly. The greatest width is about at mid-body. The specimens vary from 0.879 to 1.286 mm. in length by 0.481 to 0.83 mm. in width. The smallest mature specimen is 1.162 mm. in length. The cuticula is unspined and very thick. In cross-sections, however, what seem to be rudimentary narrow spines can be seen embedded in the cuticula perpendicular to the body surface, ventral to the region of the ovary and ventrally near the genital pore.

The oral sucker is well developed, ventral and sub-terminal in position, with circular opening. The ventral sucker has a slightly greater transverse diameter than does the oral sucker. It is located approximately at mid-body. The diameter of the ventral sucker is about one-fourth the diameter of the body at this point. The prepharynx is short, pharynx ovoid, and the esophagus very short. The intestinal ceca are narrow and distant from the sides of the body. They curve around the testes on each side and approach each other in the posterior region of the body, ending a short distance in front of the posterior end.

The genital pore is median directly in front of the ventral sucker. The two testes are diagonal, close together, intercecal, slightly lobed or at least with irregular contour, located not quite half-way between ovary and posterior end of the body. The sac-shaped seminal vesicle is median in position, partly dorsal and partly posterior to the ventral sucker, its posterior end at mid-ovary level. Just anterior to the middle of the sucker it leads into a very minute, thin-walled, non-muscular tube which leads to the genital atrium. There is no trace of cirrus, cirrus sac, or prostate gland. The genital atrium is short, thin-walled, and sometimes somewhat swollen as if inflated (fig. 1).

The ovary is spherical, slightly to the right, immediately posterior to the ventral sucker. Mehlis' gland is well developed and appears as a rather compact mass just posterior and to the left of the ovary. Laurer's canal is present. A large seminal receptacle extends dorsally and anteriorly along the right side of the ventral sucker. The uterus extends laterally to the left of the ovary, then straight forward as a short, swollen, thin-walled tube dorsal to the ventral sucker. Near the anterior edge of the sucker it narrows to a short, muscular tube, the metraterm, which opens into the thin-walled atrium at the border of the sucker. The follicles of the vitellaria are medium-sized and extend from the level of the intestinal bifurcation to near the posterior end. Largely extra-cecal and dorsal, they are confluent anterior to the ventral sucker and posterior to the testes. They also meet behind the ceca and even behind the excretory pore. The vitellaria do not reach to the edge of the body at any point. The eggs are few, large and thin-shelled.

The excretory pore is dorsal, median and well anterior to the posterior end of the body at about the same level as the posterior end of the ceca. The median, unpaired excretory vesicle is short, terminating at the posterior edge of the posterior testis.

Lepocreadiidae

Crassicutis cichlasomae Manter, 1936

Redescription from Bravo-Hollis & Arroyo (1962)

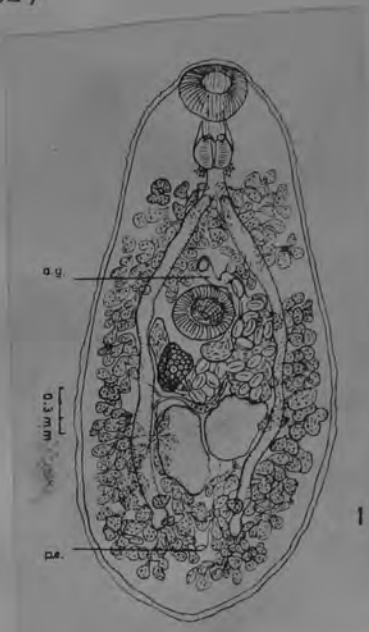
En 1959 uno de los autores del presente trabajo, Lic. Guido Arroyo, localizó los tremátodos que aquí se describen en carpas de agua dulce procedentes de Quebrada Grande, lugar cercano a la costa del Pacífico en Liberia, Provincia de Guanacaste.

Según MANTER (2) los géneros *Crassicutis* Manter, 1936 y *Homalometron* Stafford, 1904 de la subfamilia *Homalometrinae* Cable y Hunninen, 1942 se han localizado en peces de agua dulce y salobre.

Hasta la fecha se han descrito tres especies del género *Crassicutis*: *C. cichlasomae* Manter, 1936 (1), del estómago de *Cichlasoma mayorum* procedente de un cenote de Yucatán, México, cercano al mar Caribe, *C. marina* Manter, 1947 en mojarras marinas, de Tortugas, Florida y *C. arcochargis* Sparks y Thatcher, 1960 (4) de peces marinos procedentes de Grand Isle, Louisiana. En el presente trabajo se describe una cuarta especie, *Crassicutis opisthoseminis* n. sp., del intestino de una carpa de agua dulce.

Crassicutis cichlasomae Manter, 1936

La redescripción y medidas están basadas en cuatro ejemplares adultos y uno inmaduro



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El cuerpo de estos tremátodos es ovoide de extremos redondeados, teniendo la extremidad posterior más amplia. Miden de largo 1,245 a 3,510 mm por 0,840 a 1,650 mm en su mayor anchura, a nivel de la zona testicular. El ejemplar inmaduro mide 1,050 mm de largo por 0,780 mm de ancho. La cutícula aparentemente sin espinas mide de 0,008 a 0,012 mm de grueso, con pequeñas proyecciones a manera de papilas glandulosas, más abundantes en la zona preacetabular que le dan aspecto rugoso.

La ventosa oral, de abertura ventral y circular, es globosa, subterminal; mide 0,110 a 0,345 mm de diámetro anteroposterior, por 0,145 a 0,427 mm de diámetro transversal. El acetábulo ocupa el segundo quinto del cuerpo y se sitúa más o menos a la misma distancia de la bifurcación que la ventosa oral; mide 0,141 a 0,375 mm de diámetro anteroposterior y 0,160 a 0,390 mm de diámetro transversal; la relación de los diámetros de las dos ventosas es de 1 : 1 a 1 : 1,3 para el diámetro anteroposterior y de 1 : 0,9 a 1 : 1,15 para el transversal.

La ventosa oral se comunica con una prefaringe de paredes delgadas no musculosas que mide 0,053 a 0,120 mm de largo por 0,074 a 0,120 mm de ancho; la faringe de paredes gruesas y musculosas, un poco más angosta hacia el extremo anterior mide 0,061 a 0,195 mm de diámetro anteroposterior por 0,102 a 0,225 mm de diámetro transversal en su máxima anchura. Estos dos órganos están envueltos por una membrana que se extiende desde la base de la ventosa oral hasta la zona ecuatorial de la faringe; el esófago mide 0,082 a 0,210 mm de largo; la bifurcación cecal se inicia en el tercio medio preacetabular.

Los ciegos corren paralelos, bastante separados de las paredes del cuerpo y terminan libres en el tercio anterior de la zona postesticular; con tendencia a aproximar sus extremos y no se yuxtaponen con los órganos intercecales sino que los bordean. La zona postesticular mide 0,330 a 0,780 mm.

Los dos testículos son postovaricos, ocupan el tercio medio de la zona postacetabular, en posición oblicua, aunque tienden a ser equidistantes muy cercanos entre sí; sus bordes son irregulares. El testículo anterior que es el izquierdo mide 0,210 a 0,465 mm de ancho; el posterior mide 0,225 a 0,570 mm de largo por 0,150 a 0,375 mm de ancho; los conductos eferentes se unen al desembocar en la vesícula seminal que es sacciforme y se inicia en la línea media sobrepasando el borde posterior del acetábulo y llega a nivel del ovario; asciende angostándose y se continúa con el conducto eyaculador, delgado, que sube bordeando dorsalmente el acetábulo por su lado izquierdo para terminar en un atrio genital, que se encuentra también sobre la línea media del cuerpo, cerca del borde anterior del acetábulo, en donde se localiza el poro genital.

Como es característico del género, carecen de la bolsa del cirro, próstata, y cirro.

El ovario es más o menos ovoide o de forma irregular situado en el lado derecho intercecal entre el acetábulo, el testículo posterior y la vesícula seminal; mide 0,123 a 0,270 mm de largo por 0,110 a 0,225 mm de ancho; por medio de un corto oviducto desemboca en el ootipo rodeado por escasas células de la glándula de Mehlis, que se distribuyen más bien en la zona uterina. El recep-

táculo seminal sacciforme, preovárico, situado en el espacio que queda entre el ciego derecho, el ovario y el acetábulo mide 0,145 a 0,300 mm de largo por 0,067 a 0,135 mm de ancho, por su extremo posterior se continúa con un conducto que pasa por la superficie dorsal del ovario o bordeándolo por sus lados dorsal derecho y posterior para desembocar en el ootipo en donde llegan los espermatozoides hasta el oviducto. Del borde anterior del ootipo parte el canal de Laurer que en forma sinuosa desemboca dorsalmente cerca de la línea media del cuerpo y posterior a la vesícula seminal. Las vitelógenas son dorsales, constituidas por folículos grandes de forma irregular, más o menos abundantes que se extienden desde la zona faríngea o esofágica hasta el extremo posterior del cuerpo, siendo confluentes en ambos extremos y con muy pocos folículos cecales e intercecales en la zona pretesticular; a nivel del borde anterior de los testículos forman los viteloductos, que se unen a ambos lados hacia la línea media para constituir un receptáculo vitelino, en donde se origina un conducto que desemboca en el ootipo.

El útero ocupa el lado izquierdo intercecal en una zona limitada por el acetábulo, ovario y testículos, en donde abundan células tipo glándula de Mehlis, asciende por el borde izquierdo del acetábulo, formando algunas vueltas y desemboca en el inicio del atrio genital. Los huevecillos son operculados de cáscara delgada amarillenta, miden 0,094 a 0,120 mm de largo por 0,069 a 0,082 mm de ancho.

El poro excretor está sobre la línea media longitudinal del cuerpo, casi a nivel de la terminación cecal.

HUÉSPED: *Cichlasoma* sp.

LOCALIZACIÓN GEOGRÁFICA: Quebrada Grande, Liberia, Provincia de Guanacaste, Costa Rica.

EJEMPLARES: En la colección helmintológica del Instituto de Biología de la Universidad Nacional Autónoma de México con el Nº 218-7 y en la del Departamento de Parasitología, Facultad de Microbiología, Universidad de Costa Rica con el Nº 200-38.

DISCUSIÓN. Este género fue instituido por MANTER en 1936 (1) en un material encontrado en el estómago de un pez *Cichlasoma mayorum* Hubs colectado por Pearse en el Cenote Xtoloc de Chichen Itzá, Mérida, Yucatán. Más tarde en 1947 el mismo MANTER (2) describe la segunda especie *Crassicutis marina* del intestino de peces marinos *Encinostomus lefroyi* (Goode) y *Gerres cinereus* (Walbaum); de Tortugas, Florida.

SPARKS y THATCHER reportan una tercera especie en 1960 (4) *Crassicutis archosargi* del intestino de *Archosargus probatocephalus*, pez marino procedente de Grand Isle, Lousiana.

Al revisar los trabajos de SKRJABIN (3) y YAMAGUTI (5, 6) y al comparar nuestros ejemplares con la descripción original de Manter, 1936 encontramos que coinciden en la mayor parte de sus características, sin embargo apreciamos las siguientes diferencias: uno de nuestros especímenes resultó ser de mayor tamaño que los de Manter; en otro el acetábulo es ligeramente menor en

su diámetro transversal que el de la ventosa oral. La membrana que envuelve la prefaringe y parte de la faringe, no es mencionada por Manter, 1936. Los huevecillos en la especie de Manter son un poco mayores.

Trematoda

Fam. Lepocreadiidae Nicoll, 1935

1. *Crassicutis cichlasomae* Manter, 1936 (Fig. 1a)

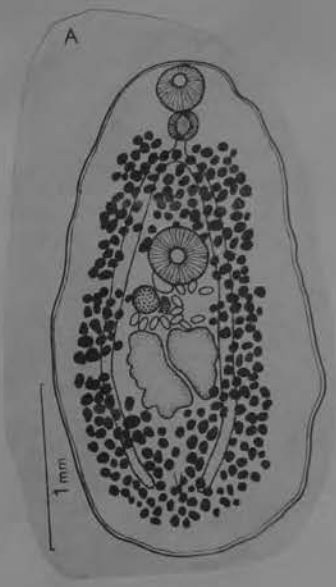
Host: *Cichlasoma tetracantha* (Cuvier et Valenciennes).
Location: intestine.

Locality: Rio Mosquito — new dam (province Pinar del Rio), Laquito — Marianao and the canal near Guanimar (province Habana), Laguna del Tesoro — Zapata (province Las Villas). This species was found in 6 from a total of 31 hosts examined (intensity of infection 1 – 12 specimens).

Description: Body oval, with very strong, smooth cuticle. Body length of adult specimens 1.088—3.100 mm, maximum width 0.694—1.700 mm. Subterminal oral sucker measuring 0.150—0.285 × 0.150—0.285 mm, acetabulum situated slightly preequatorially, 0.135—0.353 × 0.150—0.353 mm. Size of muscular pharynx 0.060—0.082 × 0.075—0.190 mm, oesophagus very short. Caeca slender, ending near posterior end of body. Excretory vesicle opening approximately at the level of caeca endings. Testes slightly lobed, left testis usually more elongated and larger. Size of left testis 0.237—0.585 × × 0.114—0.299 mm, of right testis 0.069—0.177 × 0.099—0.204 mm. Seminal vesicle small, situated dorsally from acetabulum. Ovary small (0.069—0.177 × 0.099—0.204 mm), globular, situated in space between left testis and acetabulum. Uterus upward, genital pore medial, just anterior to acetabulum. Eggs oval, size 0.063—0.069 × 0.096—0.114 mm. Vitelline follicles extending mainly laterally and dorsally from caeca and connecting in space behind testes.

This species has been known from *Cichlasoma mayorum* from the peninsula Yucatan (Manter, 1936) and *Cichlasoma* sp. from Costa Rica (Bravo-Hollis, Arroyo, 1962). *Cichlasoma tetracantha* is a new host.

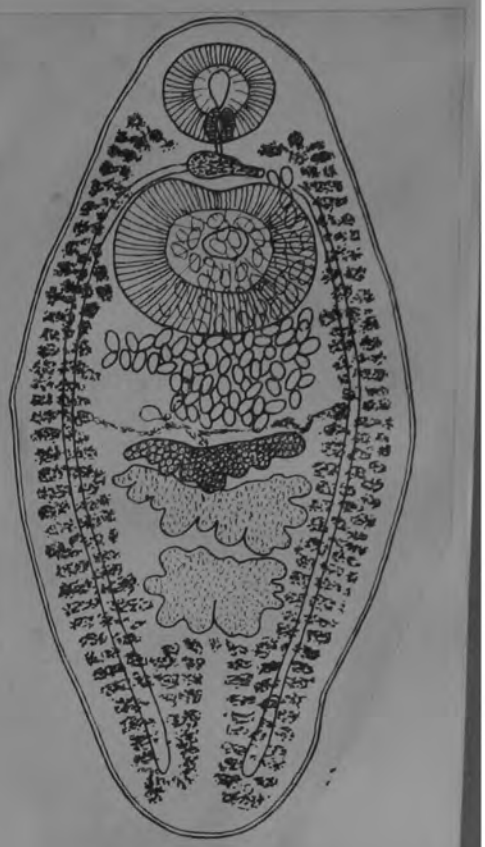
MORAVEC AND BARUŠ, 1971



Familia Lepocreadiidae MANTER 1947
Género Crassicutis MANTER 1936

2. Crassicutis antarcticus STIDAT AND GRAEFE, 1967 ~~n. sp.~~ (fig.2). En lugar de Plagioporus pennelli encontramos en los apéndices y el intestino anterior otra especie de trematode, exteriormente parecida pero más grande. Por sus características (cutícula gruesa sin espinas, falta de bolsa de cirro, poro genital inmediatamente anterior a la ventosa ventral, vesícula seminal simple, etc.) pertenece al género Crassicutis, clasificación creada por MANTER (1936) y separado del género sistemáticamente relacionado Homalometra de la familia Lepocreadiidae. Según NAHHAS y CABLE (1964), el género Crassicutis contenía hasta ahora sólo 4 especies: C. cichlosomae MANTER, C. marina MANTER, C. archosargi SPARKS y THATCHER y C. gerridis NAHHAS y CABLE. La especie nueva se diferencia de todas ellas especialmente por las glándulas sexuales lobadas, ovario y testículos, y huevos menores. Los hospedadores intermediarios de las especies del género Crassicutis son desconocidos.

Este trematode mide alrededor de 2, 3 mm de largo y alrededor de 1, 1 mm de ancho. La ventosa oral circular tiene de diámetro o, 3 mm; la ventosa ventral, 0, 55 mm; y la faringe 0, 1 mm; los huevos miden solamente de 0, 05 a 0, 06 mm de largo y de 0, 025 a 0, 03 de ancho.



In April, 1957, while the authors were working at the Texas A & M Research Foundation Marine Laboratory at Grand Isle, Louisiana, a sheepshead (*Archosargus probatocephalus*) was examined and found to contain eleven specimens of an Allocreadid trematode belonging to an undescribed species of the genus *Crassicutis* Manter, 1936. Ten of the specimens were fixed and stained by standard methods as whole mounts; serial sections were made of the eleventh.

Sparks & Thatcher, 1960

Crassicutis archosargii n. sp. (Fig. 1)

Host: *Archosargus probatocephalus* (Walbaum)
Location in host: midgut
Locality: Grand Isle, Louisiana

Diagnosis: With the characteristics of the genus, except that the thickening of the cuticle described by Manter (1936) was observed in only two specimens. The following dimensions are given in millimeters:

Body elongate oval, measuring from 3.097 to 3.700, averaging 3.421 in length by 0.931 to 1.578, averaging 1.239 in width; oral sucker and acetabulum approximately equal in size; the former ranging from 0.190 to 0.280 in length by 0.190 to 0.304 in width, averaging 0.230 to 0.251, acetabulum ranging from 0.181 to 0.323 in length by 0.171 to 0.337 in width, averaging 0.253 to 0.256; pharynx from 0.950 to 0.190 by 0.114 to 0.195, averaging 0.114 to 0.159; anterior testis 0.290 to 0.561 long, averaging 0.404, by 0.247 to 0.380, averaging 0.311 in width; posterior testis slightly larger, ranging from 0.390 to 0.608 in length, averaging 0.513 long, and from 0.266 to 0.494, averaging 0.348 in width; ovary from 0.209 to 0.247 long by 0.152 to 0.210 wide, averaging 0.223 by 0.186; eggs 0.095 to 0.124 by 0.057 to 0.076, averaging 0.114 by 0.058.

Seminal receptacle large, lying dorsal to and extending anterior to ovary; seminal vesicle large and conspicuous lying in the midline of the body, usually extending anterior to posterior margin of acetabulum; vitelline follicles large and numerous; extending anteriad beyond the acetabulum and across the body in front of the acetabulum as in other species of the genus; vitelline ducts conspicuous; Mehlis gland located between anterior testis and ovary to the right of the midline.

The name *Crassicutis archosargii* is proposed to signify the type host. The holotype has been deposited in the collection of the U. S. National Museum, U.S.N.M. Helm. Coll. No. 39027. A paratype has been placed in the Invertebrate Collection of the College of Fisheries, University of Washington and additional paratypes are in the collections of the authors.

Discussion and comparison with other species.

Two species have been previously described in the genus *Crassicutis*, *C. Cichlasomae* Manter, 1936 from a fresh water fish of Yucatan and *C. marina* from two species of marine fish in Florida. *C. archosargii* is most like *C. marina* Manter, 1947, but differs from it in size, being considerably larger in body length and having larger eggs, but with both a smaller oral sucker and acetabulum. Additionally, the thickening of the cuticle listed by Manter (1936) as a generic character and also demonstrated in the drawing of *C. marina* was observed in only two of the eleven specimens collected by the authors.

A table follows comparing *C. archosargii* with other known species of *Crassicutis*.

TABLE I
Comparison of *C. archosargii* With Other Species

Characteristic	*C. cichlasomae*	*C. marina*	*C. archosargii*
Habitat of host.....	Fresh water	Marine	Marine
Body length.....	0.747–1.286 mm.	1.5–2.8 mm.	3.097–3.700 mm.
Egg size.....	110–114 μ 64–66 μ	84 to 100 μ 50–63 μ	95–124 μ 57–76 μ
Cuticle.....	Thickened	Thickened	Usually not thickened
Anterior sucker	0.124–0.164 mm. in dia.	0.195–0.340 mm. dia.	0.190–0.304 mm. dia.
Acetabulum.....	0.130–0.206 mm.	0.290–0.510 mm.	0.181–0.323 mm.

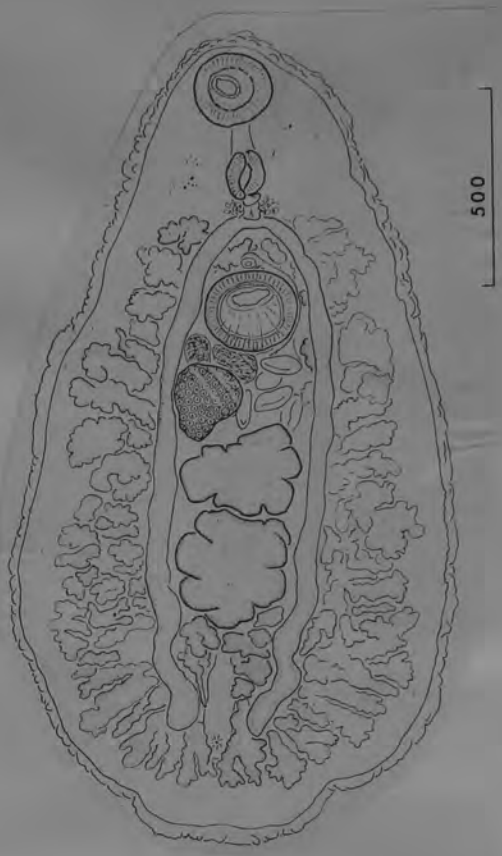
***Crassicutis archosargi* Sparks and Thatcher 1960**
(Figs. 1–3)

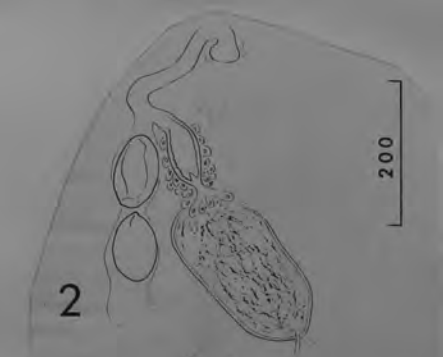
Redescription (based on 46 specimens, many parasitized in various degrees by a myxosporidan, and the holotype, USNM Helm. Coll. No. 39027, for which measurements follow in parentheses): Body yellowish-orange in life, 1,527 to 3,589 (3,180) long by 696 to 1,392 (1,090) wide at testicular, or widest level. Tegument thick; thickest margin per worm 16 to 45 (12); rugose, especially in forebody; lacking spines. Eyespot pigment sparse, dispersed. Dorso-ventral muscle bundles conspicuously prevalent in many specimens. Oral sucker subterminal, nearly spherical, 133 to 229 (223) long by 139 to 245 (229) wide, with ventral mouth. Sucker-width ratio 1:1.1 to 1.5 (1:1.0). Forebody 21 to 31% of body length. Prepharynx thick-walled, usually more than ½ length of pharynx. Pharynx 90 to 162 (113) long by 87 to 157 (135) wide, with inconspicuous anterior band of circular muscles. Esophagus either longer or shorter than pharynx, depending on state of contraction, surrounded by glandular cells. Intestinal bifurcation roughly midway between pharynx and acetabulum; ceca densely epitheliated, terminating 7 to 22 (12)% of body length from posterior end of body.

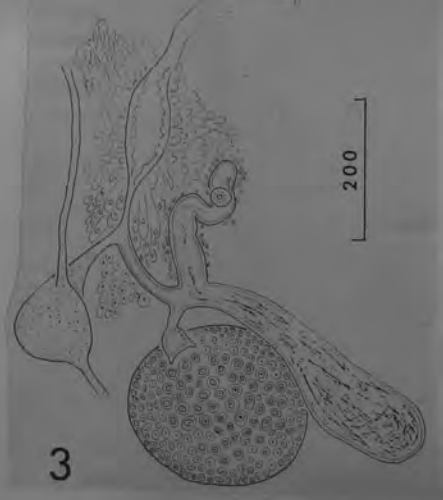
Testes tandem, contiguous or nearly so, smooth to lobed in shape; anterior testis 128 to 454 (438) long by 142 to 442 (247) wide; posterior testis 171 to 504 (478) long by 126 to 422 (277) wide; posttesticular space 14 to 34 (30)% of body length. Seminal vesicle saccate, 94 to 345 (>500) long by 58 to 307 (183) wide, occasionally overlapping acetabulum or ovary. Cirrus sac absent, but thin incomplete membrane surrounding prostatic cells near distal (anterior) portion of seminal vesicle; prostatic cells few, most conspicuous around prostatic duct, elongated cells near distal portion of seminal vesicle, small cells sparsely surrounding long muscular hermaphroditic duct; prostatic vesicle with internal anucleated membrane-bound bodies absent, but distinct muscular atrium present with cone-shaped muscular sphincter projecting inwards. Genital pore median or submedian, immediately preacetabular.

Ovary globular to spherical, consistently dextral in all but one specimen, roughly midway between anterior testis and acetabulum, 93 to 215 (206) long by 97 to 204 (177) wide. Seminal receptacle typically elongate and longer than and overlapping ovary. Mehlis' gland compact, adjacent to ovary and anterior testis. Laurer's canal muscular. Oviduct with oocapt. Vitellaria consisting of numerous follicles or irregularly-shaped "bands," extending from near posterior end of body forward to well anterior to acetabulum in most specimens, to anterior border of acetabulum in 10 specimens; confluent in hindbody of all specimens and in forebody of majority of them; overlapping ceca dorsally but not ventrally except very small follicles or portions of few large ones in few specimens; seldom extending to near margins. Eggs operculated, with minute projection at anopercular pole, 70 to 129 (107 to 129) long by 44 to 78 (54 to 64) wide in partially-collapsed mounted material, 95 to 113 long by 63 to 74 wide from 2 living worms.

Excretory vesicle I-shaped, terminating anteriorly near posterior of rear testis; pore dorsal, subterminal, 5 to 13 (7)% of body length from posterior end of body.







—OVER—

Host: *Archosargus probatocephalus* (Walbaum), Sparidae.

Site: Intestine.

Localities: Mississippi Sound and adjacent areas; holotype from Grand Isle, Louisiana.

Specimens deposited: USNM Helm. Coll. No. 74135 (2 whole mounts), No. 74136 (2 slides with sections).

Discussion

The above description adds several diagnostic characteristics to the abbreviated original description (Sparks and Thatcher, 1960), as well as range extensions for measurements. It also adds some illustrations. Unfortunately, the only figure by Sparks and Thatcher has been deleted from the journal, at least those copies I examined. Page 342 of a reprint included it, but that page was replaced by reprint-page 343 in the journal. Rather than having large vitelline follicles overlapping the ceca ventrally as suggested in that illustration, there occurs a relatively clear area, and, unlike the paratypes, a thick tegument characterizes all worms collected in Mississippi. A redescription seemed necessary in light of several unreported features of *Crassicutis archosargi* and the uncertainty of a phylogenetic classification of members of *Crassicutis* Manter 1936 and related genera.

The digenean *Crassicutis archosargi* Sparks and Thatcher 1960 infects its only known final host, the sheepshead, *Archosargus probatocephalus* (Walbaum), in Mississippi. Previously, it had been reported only from Grand Isle, Louisiana (Sparks and Thatcher, 1960) and Rockport, Texas (Joy, 1971). Specimens exhibited unusual features. Some possessed refractile bodies in the tegument, others attached to their piscine host by an adhesive tegument, and still others hosted two protozoans. This paper reports those features.

MATERIALS AND METHODS

Several sheepshead collected by trawl and maintained alive provided fresh parasites. Whole mounts of the trematode were fixed in hot AFA solution under minimal coverslip pressure, stained with Van Cleave's hematoxylin, and mounted in Histoclad or Permount. Treatment of sectioned specimens included a number of histological techniques mentioned in the text; methods followed those described in a manual edited by Luna (1968). I drew illustrations with the aid of a camera lucida and present measurements in micrometers.

From OVERSTREET, 1976

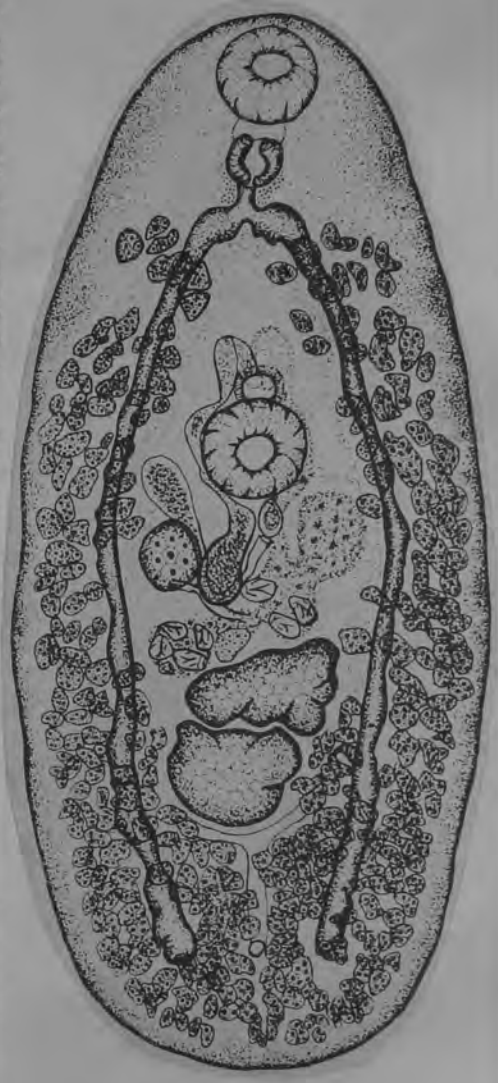
Crassicutis bravoae ~~n. sp.~~ JIMINEZ G. AND CABALLERO Y C., 1974
Figs. 1 y 2, Tablas 1 y 2

DESCRIPCION: Se fundamenta en 26 ejemplares de los cuales 12 fueron medidos; los tremátodos *in vivo* tienen cuerpo oval de color amarillento, cuando se contraen dan la apariencia de conchuelas; fijados y aplanados su forma es oval, el extremo anterior ligeramente más agudo que el posterior. Cutícula en algunos ejemplares muy gruesa y transparente. Ventosa oral subterminal fuertemente musculosa, grande, esférica. Acetábulo musculoso, esférico ligeramente menor que la ventosa oral y situado por encima del ecuador del cuerpo. Boca grande y eliptica; prefaringe corta y poco visible. Faringe pequeña musculosa y cilindrica. Esófago corto y tubular. La bifurcación intestinal se localiza muy por delante del acetábulo. Ciegos intestinales angostos, largos y tubulosos, engrosando ligeramente a manera de bolsa en el extremo posterior y se extienden dorsoventralmente hasta cerca del borde posterior del cuerpo.

Poro reproductor grande, circular, poco visible, situado sobre la linea media del cuerpo inmediatamente por encima del borde anterior del acetábulo. Dos testículos grandes, lobulados, intracecales, muy por debajo del ovario. No hay bolsa del cirro; existe una gran vesicula seminal que se inicia a nivel del ovario; corre hacia adelante unida al borde derecho del acetábulo, su forma es sacciforme y desemboca en el poro reproductor.

El ovario es de bordes lisos, ovoideo, de menor tamaño que los testículos, pretesticular, intracecal situado al lado derecho de la linea media del cuerpo; su parte interna forma el oviducto al que es une un conducto del receptáculo seminal para después unirse al ootipo a este nivel recibe los conductos de las glándulas vitelógenas; de la región del ootipo se origina un conducto de Laurer que desemboca en la parte dorsal del cuerpo a nivel de la linea media, posterior al acetábulo. El ootipo y la glándula de Mehlis son poco visibles, se encuentra en el área media del cuerpo entre el ovario y el testículo anterior. El receptáculo seminal es de forma sacciforme se localiza al lado derecho del cuerpo por arriba del ovario, entre el limite del ciego intestinal derecho y el borde lateroposterior del acetábulo, estrangulándose en su parte posterior para formar un conducto largo y estrecho que desemboca cerca del ootipo. El útero se localiza entre el acetábulo, el ovario y el testículo anterior; forma una asa ascendente que pasa del lado izquierdo del cuerpo, entre el acetábulo y el ciego intestinal del mismo lado y termina en el poro reproductor. Los huevecillos son grandes de cáscara lisa, amarillenta y con un pequeño opérculo.

Las glándulas vitelógenas son ventrolaterales, se extienden desde el nivel de la bifurcación intestinal hasta cerca del borde posterior del cuerpo, invaden estas las áreas cecales y extracecales hasta el nivel de los testículos, de donde pasan después a ocupar las áreas intercecales, cecales y extracecales después del nivel del testículo posterior. Los foliculos vitelinos se encuentran bien desarrollados, son de forma ovoidea. Poro excretor sobre la linea media del cuerpo, subterminal desemboca a nivel posterior de los ciegos intestinales en la parte dorsal del cuerpo.



1 MM.

VARIACIONES: Las variaciones más comúnes que presentan estos parásitos son: cutícula muy gruesa o delgada, ventosa oral terminal, presencia de una estructura membranosa semejante a una prefaringe, vesicula seminal al lado derecho del cuerpo; testículos muy grandes o pequeños, algunas veces ligeramente lobulados u ovoideos; ovario y receptáculo seminal al lado derecho del cuerpo, ocasionalmente los foliculos vitelinos tienden a unirse a la altura de la bifurcación intestinal (sin llegar a ocupar la totalidad del espacio comprendido entre la bifurcación intestinal y el acetábulo) en sus fases jóvenes los foliculos vitelinos no alcanzan a llegar a nivel de la bifurcación intestinal. Este conjunto de variaciones obligan a aplicar un método estadistico de *dosimas de independencia* (Chou, 1972) con el objeto de establecer si la población de tremátodos estudiados realmente correspondia a una sola especie; se relacionó la longitud total (LT.) con la distancia del acetábulo al extremo anterior (DA.) y la distancia de la bifurcación intestinal al extremo

—OVER—

anterior (DB.) para establecer si existe alguna relación de dependencia entre las medidas (mínima y máxima) y los cocientes $\frac{LT.}{DA.}$ y $\frac{LT.}{DB.}$ para demostrar que DA. y DB. son dependientes o están relacionados con LT. La región crítica de esta dósima es 6.63 $X^2 < \infty$. El parámetro calculado con los datos es $X^2 = 0.161$, lo cual conduce a aceptar la hipótesis establecida.

Hospedero: mojarra *Cichlasoma cyanoguttatus cyanoguttatus;* Fam. Cichlidae.

Localización: estómago e intestino

Localidad: Presa Rodrigo Gómez (antes La Boca), Santiago, Nuevo León, México. (25° 26' Lat. N, 100° 09' Long. W).

Holotipo: Depositado en la Colección Helmintológica del Instituto de Biología de la Universidad Nacional Autónoma de México No. 226-16.

Paratipos: Depositados en la Colección Helmintológica de la Facultad de Ciencias Biológicas de la Universidad Autónoma de Nuevo León, Nos. UANL 39 al 50.

TABLA No. 1

MORFOMETRIA DE *Crassicutis bravoae* n. sp. MEDIDAS EN mm.

REFERENCIA		HOLOTIPO	PARATIPOS		
			mínima	media	máxima
Cuerpo	longitud	3.3370	2.2360	2.8090	3.2092
	anchura	1.5620	1.0704	1.4080	1.7040
Cuticula espesor		.0105	.0105	.0200	.0315
Ventosa oral	diám. long.	.3124	.1995	.2510	.3010
	diám. transv.	.3266	.1800	.2570	.3770
Acetábulo	diám. long.	.3266	.2135	.2770	.3255
	diám. transv.	.3408	.2275	.2880	.3325
Distancia del acetábulo al extremo anterior		1.2070	.7100	.9350	1.1218
Distancia de la bifurcación intestinal al extremo anterior		.6816	.4544	.5810	.6674
Faringe	longitud	.1575	.1085	.1330	.1575
	anchura	.1785	.1085	.1420	.2100
Ciegos intestinales	longitud	2.4850	1.7040	2.0430	2.3714
	anchura	.0630	.0385	.0580	.0710
Vesicula seminal	longitud	.8750	.6390	.8810	1.1076
	anchura	.1400	.0525	.0860	.1136
Testículo anterior	longitud	.3220	.1704	.3150	.4260
	anchura	.4970	.3124	.4000	.5680
Testículo posterior	longitud	.3220	.2272	.3230	.3976
	anchura	.4402	.2414	.3750	.5544
Ovario	longitud	.2275	.1562	.2110	.2982
	anchura	.1925	.1400	.1680	.2272
Recepáculo seminal	longitud	.4200	.3150	.3730	.5250
	anchura	.1225	.0700	.1150	.1750
Folículos vitelinos	longitud	.2030	.0420	.1060	.1846
	anchura	.0945	.0350	.0730	.0994
Huevecillos	longitud	.1225	.0980	.1150	.1400
	anchura	.0840	.0665	.0720	.0875

N O T A : Holotipo, Colección Helmintológica del Instituto de Biología de la U. N. A. M., No. 226-16.

Paratipos, Colección Helmintológica del Laboratorio de Helmintología de la Facultad de Ciencias Biológicas de la U. A. N. L., Nos. 39 al 50.

Las especies más cercanas a *Crassicutis bravoae* n. sp. son *C. cichlasomae* Manter, 1936; *C. wallini* (Pearse, 1920) Peters, 1957; *C. chuscoi* (Pearse, 1920) Peters, 1957 y *C. epsthosemimis* Bravo et Arroyo, 1962. Nuestros ejemplares difieren de la primera y última especie citadas fundamentalmente por la posición de los testículos que se encuentran uno detrás del otro, los folículos vitelinos no ocupan el espacio comprendido entre la bifurcación intestinal y el acetábulo (raramente los folículos llegan a unirse a nivel de la bifurcación intestinal) y también por la posición del receptáculo seminal; se diferencia de *C. wallini* por el tamaño de las ventosas, situación del poro reproductor y colocación de la vesícula seminal; de *C. chuscoi* por el tamaño de las ventosas, posición de los testículos y distribución de las glándulas vitelógenas. Estas características y las expuestas en el cuadro comparativo de las especies del género *Crassicutis*, inducen a pensar que el ejemplar aquí descrito es una nueva especie.

Esta especie designada como *Crassicutis bravoae* es dedicada a la M. C. B. Margarita Bravo-Hollis, en reconocimiento a su fructífera labor científica en el campo de la Helmintología.

Crassicutis chuscoi (Pearse, 1920) Peters, 1957

Allocreadium chuscoi, new species Pearse, 1920

Length, .56 mm., width, .29 mm.; body widest behind middle (Fig. 8). Acetabulum and oral sucker nearly equal in size; ratio of diameter of oral sucker to that of pharynx about 11 to 4. Diameter of acetabulum, .084mm.

Genital field, exclusive of vitellaria, occupying the middle half of the body. Ovary somewhat angular, at the right

posterior margin of the acetabulum. Uterus short, coiled somewhat posterior to acetabulum. None of the specimens examined contained eggs. Genital pore in the median line immediately anterior to the acetabulum. Cirrus sac elongated, pear shaped, eleven-fourteenths as long as diameter of acetabulum.

Testes lobate, the anterior one somewhat on the left of the median line, the posterior one somewhat on the right. Vitellaria small, ellipsoidal, arranged in a V-shaped area outside the intestinal rami and across the posterior end of the body. Intestinal rami smooth, slender (diam. .02 mm.) extending to within one-seventh of posterior end of body.

Host: Chusco, *Aquidens pulcher* Gill, in intestine.

Type: Cat. No. 7562 (Helm. Coll. U. S. N. M.); collected in mouth of Rio Bue, near Maracay, Lake Valencia, July 19, 1918.

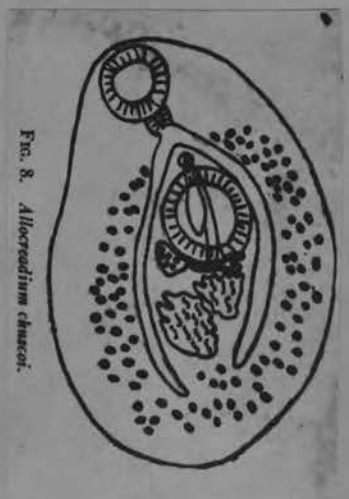


FIG. 8. *Allocreadium chuscoi.*

Lepocreadiidae

Crassicutis **gerridis** n.sp.
Figure 16 Nahhas & Cable, 1963

Host: Gerres cinereus (C, J).
Site: intestine.
Holotype: U.S.N.M. 60265.

Description based on 15 specimens. Body elongated, 1.04-2.6 long, 0.400-0.710 wide.

Long, very narrow, widely spaced spines imbedded in thick cuticle of larger specimens but not of immature ones. Eye-spot pigment present. Oral sucker 0.173-0.280 in diameter; ventral sucker equatorial, 0.206-0.400 long, 0.267-0.333 wide; sucker ratio 1:1.13-1.43. Prepharynx about 3/4 length of pharynx; pharynx 0.055-0.105 long, 0.075-0.114 wide; esophagus shorter than pharynx, intestinal bifurcation well anterior to ventral sucker; ceca long, extending almost to posterior end of body. Testes tandem, close together, 0.100-0.300 long, 0.180-0.333 wide; posttesticular space 1/6-1/8 body length. Cirrus sac absent; ejaculatory duct relatively long, opening into indistinct genital atrium; pars prostatica small, with indistinct prostate cells; seminal vesicle saccular, extending to or slightly beyond posterior edge of ventral sucker. Genital pore small, median, immediately anterior to ventral sucker. Ovary smooth, 0.100-0.233 in diameter, separated from anterior testis by Mehlis' gland; seminal receptacle small, inconspicuous, antero- or laterodorsal to ovary; Laurer's canal opens dorsally, median to ovary; uterus pretesticular; metraterm not observed. Vitellaria of large follicles extending from posterior edge of oral sucker or pharynx to posterior end of body, occupying all available space between ventral sucker and pharynx. Eggs 83-113 by 46-60 μ. Excretory vesicle short, sac-shaped, not quite reaching posterior testis.

Three species of *Crassicutis* have been described. *C. cichlasomae* Manter, 1936, from a fresh-water host, *C. marina* Manter, 1947, and *C. archosargi* Sparks & Thatcher, 1960. *C. gerridis* differs from all 3 in having a long forebody filled with vitelline follicles. In addition it differs from *C. cichlasomae* in habitat and in having tandem rather than diagonal testes. It differs from *C. archosargi* in the position of the ventral sucker and position of the gonads. *C. marina*, described from the same host in Florida and also found in this study, differs from *C. gerridis* chiefly in having a more anterior ventral sucker and much less extensive preacetabular vitellaria, differences observed in living specimens as well as whole mounts; other possible differences are the less conspicuous seminal vesicle and seminal receptacle in *C. gerridis*.

Specimens from Tortugas from Lecinostomum leptogé seem to be their species

Crassicutis karwarensis sp.nov. (Fig. 5) Hafeezullah, 1970

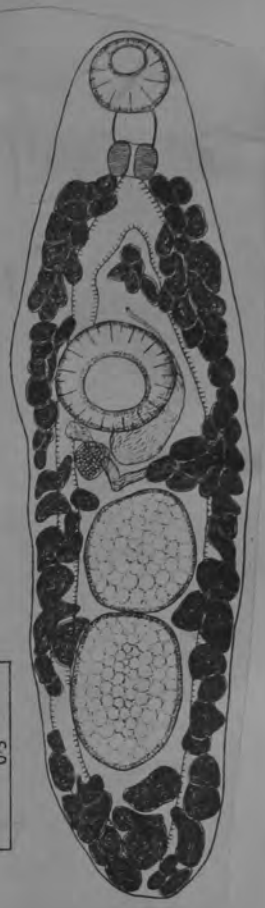
Host: Gerres filamentosus Cuv.; long-rayed silver biddy; Leiognathidae
Site: intestine
Number of specimens: 20
Locality: Karwar
Description (with measurements on eight specimens): Body 1·29–3·02 mm long; 0·37–0·98 mm wide, elongate with rounded posterior and slightly narrowing anterior end of body. Cuticle thick, spines probably lost in processing. Eye-spot pigment present. Acetabulum 215–360 in diameter, spherical, pre-equatorial, at 438–1116 from anterior end. Oral sucker 143–295 in diameter, spherical, subterminal. Sucker ratio 1:1·22–1·52. Prepharynx 24–95 long; pharynx 72–134 by 80–158; oesophagus short, caeca simple, reaching posterior end of body.

Testes 161–534 by 155–396, entire, tandem, in posterior half of body. Cirrus sac absent. Seminal vesicle 224–323 by 51–168, sac-like, posterosinistral and dorsal to acetabulum; ejaculatory duct curving along anterior margin of acetabulum. Genital pore median, slightly anterior to acetabulum.

Ovary 91–140 by 90–188, subglobular, submedian to right, between anterior testis and acetabulum. Seminal receptacle club-shaped, dorsal to ovary, between anterior testis and acetabulum, occasionally tubular. Laurer's canal present. Vitellaria consisting of large follicles, invariably from level of caecal bifurcation to posterior end of body, confluent in pre-acetabular and post-testicular regions, overlapping caeca ventrally and dorsally. Uterus not observed in any specimen. Only one collapsed egg measuring 81–57. Excretory vesicle not observed.

Remarks

Crassicutis karwarensis resembles *C. marina* Manter, 1947, described from a closely related host species at Tortugas, Florida, but differs from it in the anterior extent of vitelline follicles (in *C. marina* it extends up to posterior half of oral sucker).



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32. Crassicutis marina Manter, 1947

Fig. 17

HOSTS: *Eucinostomus lefroyi* (Goode), Florida mojarra, type host; in 4 of 7 hosts examined. *Gerres cinereus* (Walbaum), gray mojarra; in 3 of 15 hosts examined.

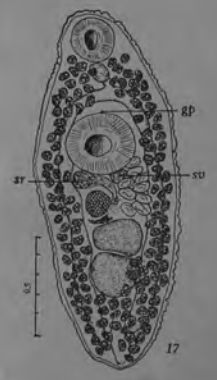
LOCATION: Intestine.

Description: Size 1.500 to 2.800 by 0.730 to 1.190 mm. A specimen 1.305 mm long was immature. Body rather thick; tapering only slightly and approximately equally at each end; cuticula unspined, thick, wrinkled and rugose, almost lobed in places. Oral sucker subterminal; 0.195 to 0.340 mm in diameter; acetabulum about 1/3 body length from anterior end; 0.280 to 0.510 mm in diameter; sucker ratio 2:3. Short prepharynx; pharynx 0.102 to 0.187 mm long by 0.088 to 0.146 mm wide; esophagus short; bifurcation usually somewhat nearer to acetabulum than to oral sucker; ceca rather broad, extending to near posterior end of body. Genital pore inconspicuous, median, closely anterior to acetabulum. Testes two; smooth; rounded to somewhat elongate; tandem; close together, posterior to midbody; intercecal. Posttesticular space 0.255 to 0.536 mm. Seminal vesicle small, sac-like, at left posterior border of acetabulum; a narrow ejaculatory duct connects the seminal vesicle with a short inconspicuous genital atrium near the genital pore; cirrus, cirrus sac and prostate gland lacking. Ovary globular, smooth, slightly to the right, pretesticular. Seminal receptacle large, flask-shaped, between ovary and acetabulum. Laurer's canal present, opening dorsally near posterior edge of acetabulum. Uterus pretesticular, to left of and anterior to ovary; metraterm lacking. Vitelline follicles large, close together, filling most of body from posterior half of oral sucker to posterior end of body; dorsal, ventral and lateral to ceca; confluent at pharynx level and posterior to testes. Yolk reservoir between ovary and anterior testis. Eggs large, few, thin-shelled, 84 to 100 by 50 to 63 μ. Excretory pore at posterior end of body; excretory vesicle thin-walled, short, extending anteriorly to posterior testis.

Discussion: The decision to place this species in the genus *Crassicutis* involves the conclusion that this genus is to be separated from *Homalometron* on the basis of absence of body spines, very thick cuticula, and perhaps also, the anteriorly confluent vitellaria. The only other species in *Crassicutis* is *C. cichlasomae* Manter, 1936 from a fresh-water Yucatan fish. *C. marina* differs in body size and shape, location and shape of testes, location of excretory pore, and egg size.

Crassicutis is one of the relatively few trematode genera found in both freshwater and marine fishes. It is of interest to note that the closely related genus *Homalometron* (=*Anallocreadium*) also occurs in both freshwater and marine hosts.

Crassicutis marina Manter, 1947
Host: *Eucinostomus gula* (1 of 3)*.
Site: Midintestine.
Overstreet, 1969



Crassicutis marina Manter, 1947
Host.—*Gerres cinereus* (Walbaum), mojarra.
Location.—Rectum.
Locality.—Off Lerner Laboratory Pier, N. Bimini, B.W.I. [new locality record].
Discussion.—One mature specimen of *C. marina* agreed in all essential details with the paratypes of *C. marina.* Manter (1947) reported this species from *Eucinostomus lefroyi* and *Gerres cinereus* at Tortugas, Florida.
Soganclares 1959

Crassicutis marina Manter, 1947
Host: Gerres cinereus (J).
Site: intestine.
Nahhas & Cable, 1963

Crassicutis opisthoseminis n. sp.
Bravo-Hollis & Arroyo, 1962

Descripción y medidas basadas en el único ejemplar. El parásito es ovoide con la zona preacetabular un poco más angosta que la postacetabular y mide 3,195 mm de largo por 1,575 mm en su máxima anchura. La cutícula que mide 0,012 de grueso presenta rugosidades bastante acentuadas, provistas con espinas muy pequeñas glandulopapil formes. La ventosa oral subterminal, globosa, de abertura circular mide 0,315 mm de diámetro anteroposterior por 0,400 mm de diámetro transversal; el acetábulo es discoide, situado sobre la línea media del cuerpo y en su parte posterior de la primera mitad, un poco más cerca de la bifurcación cecal que la ventosa oral; mide 0,382 mm de diámetro anteroposterior por 0,420 mm de diámetro transversal; la relación de los diámetros de las dos ventosas es de 1 : 1,2 el del longitudinal y de 1 : 1,05 el del transversal.

La prefaringe de paredes delgadas mide 0,143 mm de largo por 0,164 mm de ancho y la faringe 0,180 mm de largo por 0,240 mm de ancho; presentando una membrana que la rodea y se origina en su zona ecuatorial y que también envuelve la prefaringe.

El esófago mide 0,195 mm de largo por 0,120 mm de ancho; las ramas cecales con la misma configuración que en las otras especies del género no sobrepasan el borde posterior del testículo posterior. La zona postesticular mide 0,465 mm.

Los testículos de forma irregular están situados oblicuamente, casi en el mismo campo, muy cercanos entre sí; el testículo anterior localizado hacia el lado izquierdo mide 0,450 mm de largo por 0,330 mm de ancho y el posterior sobre la línea longitudinal, sobrepasa ligeramente a la terminación de los ciegos intestinales y mide de largo 0,525 mm por 0,375 mm de ancho. Como en *Crassicutis cichlasoma* Manter, 1936 los conductos eferentes se unen al desembocar en la vesícula seminal que tiene la misma posición que en esa especie, pero más desarrollada; el conducto eyaculador termina en una atrio genital amplio, a través de su poro genital, que tiende a desplazarse al lado derecho preacetabular, cerca de la línea media longitudinal del cuerpo.

El ovario es ovoide, situado hacia el lado derecho en la zona comprendida entre el ciego de ese mismo lado, el acetábulo y la vesícula seminal; mide 0,255 mm de largo por 0,172 mm de ancho.

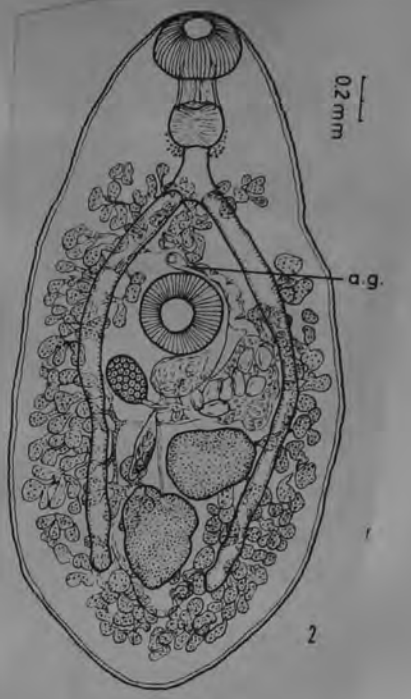
El oviducto se observa con nitidez; desemboca en el ootipo, que está rodeado por escaso número de células de la glándula de Mehlis y se localiza hacia la línea media longitudinal, posterior a la vesícula seminal. El canal de Laurer sube sinuosamente hacia adelante para terminar en un poro dorsal a la altura de la vesícula seminal.

El receptáculo seminal es sacciforme, situado hacia el lado derecho pero en sentido inverso a como se encuentra en las otras especies. Ocupa un espacio que está limitado por el ciego de ese mismo lado y el testículo posterior; se inicia cerca del borde anterior de este mismo testículo quedando su extremo anterior muy retirado del ovario, desembocando finalmente en el ootipo; mide 0,300 mm de largo por 0,105 mm de ancho.

Las glándulas vitelinas en escaso número están constituidas por masas foliculares confluentes en ambos extremos, de diferente forma, se inician a la altura de la faringe hasta el extremo posterior, formando a cada lado un vitelo-ducto, que origina un receptáculo vitelino en la línea media pretesticular, sin células vitelinas y de donde parte un conducto que desemboca en el ootipo.

El útero, con numerosas células glandulares, se sitúa en el lado izquierdo intercecal, a nivel de la vesícula seminal, bordeando el acetábulo junto al conducto eyaculador, formando en su parte distal repliegues a modo de serpentina y desembocando en el atrio genital.

Los huevecillos son operculados, de cáscara delgada y miden 0,120 mm de largo por 0,082 mm de ancho. El poro excretor se sitúa en la línea media longitudinal del cuerpo, cerca del testículo posterior.



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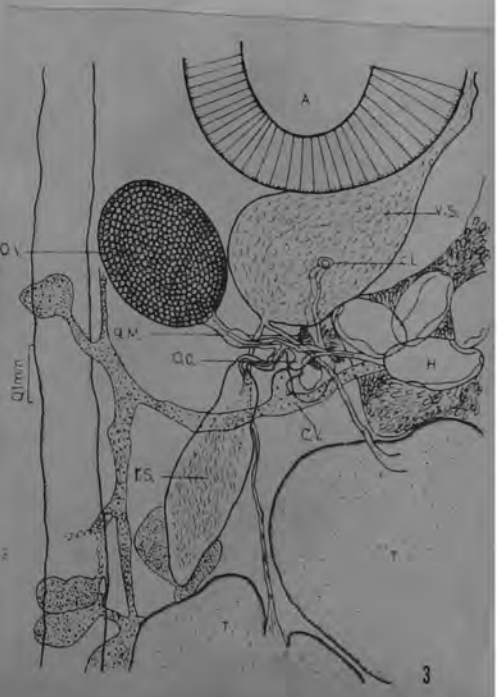


3

HUÉSPED: *Cichlasoma* sp.

LOCALIZACIÓN: Intestino.

DISTRIBUCIÓN GEOGRÁFICA: Quebrada Grande, Liberia, Provincia de Guanacaste, Costa Rica.

EJEMPLARES: Holotipo en la colección helmintológica del Instituto de Biología de la Universidad Nacional Autónoma de México con el Nº 218-8.

DISCUSIÓN. *Crassicutis opisthoseminis* n. sp. se diferencia principalmente de las otras especies reportadas por las siguientes características:

a) Posición del receptáculo seminal.
b) Posición de los testículos y su relación con la terminación de los ciegos.
c) Posición lateral del poro genital y terminal de la ventosa oral.
d) Zona postesticular reducida.

LLAVE DE LAS ESPECIES DEL GENERO *CRASSICUTIS* Manter, 1936

A. Folículos vitelógenos preacetabulares iniciándose desde la zona faríngea o esofágica.

a. Receptáculo seminal preovárico.

1. Ventosa oral menor o igual que el acetábulo ..... *Crassicutis cichlasomae* Manter, 1936

2. Ventosa oral mayor que el acetábulo ..... *Crassicutis archosargii* Sparks y Thatcher, 1960.

b. Receptáculo seminal postovárico ..... *Crassicutis opisthoseminis* n. sp.

B. Folículos vitelógenos preacetabulares, iniciándose desde la ventosa oral ..... *Crassicutis marina* Manter, 1947.

Crassicutis wallini (Pearse, 1920) Peters, 1957

Allocreadium wallini, new species Pearse, 1920

Length, 1.55 mm.; width, .74 mm.; body widest behind middle (Fig. 7). Oral sucker and acetabulum approximately equal in diameter. Ratio of diameter of oral sucker to that of pharynx about 7:3. A short prepharynx is present. Intestinal rami smooth, branching directly from pharynx, extending to posterior fifth of body. Cuticula is without spines.

The genital field, without vitellaria, occupies nearly half the length of the body and the posterior testis is one-fifth the body length from the posterior end. The spherical ovary lies on the right side of the body at the posterior margin of the acetabulum; diameter about one-fifteenth the length of the body. The lobate testes are about twice the diameter of the ovary. They are usually close together between the intestinal rami, are usually elongated across the body, and one lies anterior to the other. Vitellaria, small, rounded, filling the body posterior to the testes and distributed anteriorly along the sides to points just anterior to the acetabulum. The folds of the uterus are very large. It is coiled on the left side of the body in the region of the acetabulum, and usually contains a few (0–29; average 5) eggs (.15 mm. long). Cirrus sac elongated, pear shaped, nearly as long as the diameter of the acetabulum. Genital pore anterior to margin of acetabulum and slightly to the right of the median line.

Host: Mataguaro, *Crenicichla geayi*, in intestine.

Type: Cat. No. 7579 (Helm. Coll. U. S. N. M.); collected at Isla del Buro, Lake Valencia, Venezuela, July 9, 1918.

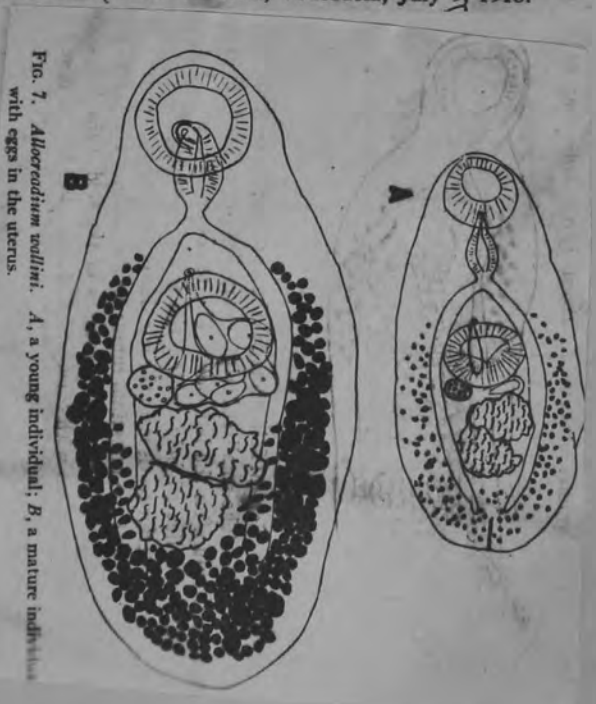


FIG. 7. *Allocreadium wallini*. *A*, a young individual; *B*, a mature individual with eggs in the uterus.

CRASSICUTIS

Bravo & Manter, 1957

DIAGNOSIS OF DACTYLOTREMA: Lepocreadiidae, subfamily Homalometrinae. Body elongate, with multispined scales. Oral sucker with paired marginal, elongate, pointed papillae embedded in edge of sucker laterally and dorsally. Mouth leads to small ovoid portion of oral sucker containing an elevated flattened tongue-like muscular structure. A concavity on dorsal surface of posterior half of oral sucker. Testes elongate, tandem, separated from ovary. Cirrus sac and cirrus lacking. Seminal vesicle tubular, almost straight, posterior to acetabulum. In intestine of marine fishes.

TYPE SPECIES: *Dactylotrema squamatum*

DISCUSSION: This genus is most closely related to *Homalometron* Stafford, 1904 particularly *H. elongatum Manter*, 1947 from a related host *Gerres cinereus* at Tortugas, Florida. It differs in its peculiar, multispined scales and above all in the complex oral sucker largely surrounded by pointed, finger-like papillae. These papillae suggest the tentacles of the anterior sucker of some gasterostomes but they contain a core of cells and do not appear to be protrusible. They are much less muscular than are the oral processes of *Enentereum* and related genera; nor are they homologous with oral processes occurring in the Waretrematidae. They are probably sensory. A restudy of specimens of *Homalometron elongatum* shows three pairs of papillae on the sides of the mouth (Fig. 12) which may be homologous structures.

The structure of the oral sucker, particularly the "oral capsule" suggests the oral bulb of *Sphincterostoma* Yamaguti, 1937 which is, however, composed of semicircular muscles. *Sphincterostoma* is similar to *Dactylotrema* in general structure but has a smooth cuticula. The muscular mass elevated in the oral capsule of *D. squamatum* may function as a tongue. The genus *Thysanopharynx* Manter, 1933 (Megaperidae) has a complex muscular tongue-like organ, as yet undescribed, in the oral cavity. *Dactylotrema* may eventually be found to have some affinity to the Megaperidae.

all discussions (Manter 1958) of Lepocreadidae.

Dactylotrema squamatum, n.g., n. sp. (Figs. 9-11)

Bravo & Manter, 1957

HOST: *Gerres* sp., "Mojarra."

LOCATION: Intestine.

LOCALITY: Zihuatanejo, Guerrero.

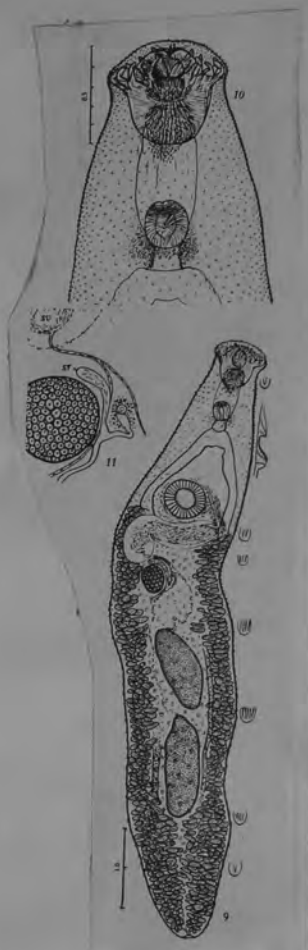
NUMBER: One specimen.

HOLOTYPE: U. S. Nat. Mus. Helm. Coll. No. 38176.

DESCRIPTION: Body elongate, 7.7 long by 1.52 wide at level of testes. Cuticula with scales, each scale with 1 to 5 spines embedded in it. Oral sucker 0.476 long by 0.407 wide, of complex structure, provided with 6 pairs of elongate, pointed processes embedded in the wall of its outer margin dorsally and laterally (Fig. 9). The pointed tips of these papillae (?) come close to the surface but none was protruded more than as a slight elevation. Central core of each papilla contains few nuclei. Mouth inconspicuous, ventral, leading to an ovoid capsule about 0.234 long and 0.195 wide, bounded posteriorly by semicircular fibers in the sucker. "Oral capsule" largely filled by broad structure with horizontal anterior edge, longitudinal bands (muscles?) in its anterior $\frac{2}{3}$, and dorsoventral muscles in its base. Oral sucker with some radial muscles and larger dorso-ventral muscles in its posterior third. A concavity with backwardly curved anterior edge occurs on dorsal surface of posterior third of oral sucker. Acetabulum at end of first $\frac{1}{4}$ body length, 0.552 long by 0.538 wide. Forebody 1.82 long. Sucker ratio 1:1.27.

Pharynx 0.234 long by 0.22 wide, 0.269 posterior to oral sucker; prepharynx too thin-walled to be visible; longitudinal muscles connect pharynx and oral sucker; esophagus about $\frac{1}{2}$ length of pharynx; intestinal bifurcation midway between suckers; ends of ceca concealed by vitellaria. Testes about 3 times longer than wide, smooth, tandem, very slightly separated, in anterior part of posterior half of body; posttesticular space 1.48. Genital pore inconspicuous, close to anterior edge of acetabulum, slightly to right. Seminal vesicle a large, mostly transverse, wide tube, just posterior to acetabulum, almost straight except that its posterior third bends backward. Pars prostatica a straight narrow tube; cirrus and cirrus sac lacking. Ovary globular, to right of midline, just anterior to middle of body, 0.468 anterior to anterior testis. Seminal receptacle narrow, elongate, curving around anterior edge of ovary. Laurer's canal opening dorsally to left of ovary at midovarian level. Uterus and eggs not developed. Vitelline follicles large, close together, from posterior edge of acetabulum to posterior end of body, surrounding ceca, confluent posterior to testes but not between gonads. Excretory pore terminal; excretory vesicle not observed.

The name *Dactylotrema* (Gr. *dactylos*, finger) refers to the finger-like papillae of the oral sucker; the name *squamatum* (L. *squama*, scale) refers to the body scales which are peculiar in being multispined.



Dactylotrema

2

Microcreadium Simer, 1929

Generic diagnosis. — Allocreadiidae, Allocreadiinae: Body small, rather plump. Oral sucker large, esophagus practically absent. Ceca reaching to near posterior extremity. Acetabulum small, in anterior half of body. Testes side by side in equatorial intercecal zone. Cirrus pouch lacking, anterodorsal to acetabulum. Genital pore immediately in front of acetabulum. Ovary submedian, between right testis and acetabulum. Receptaculum seminis present. Vitellaria occupying entire post-testicular area. Uterus winding between testes and acetabulum, containing few eggs. Excretory vesicle apparently reaching to behind testes. Parasitic in intestine of fishes.

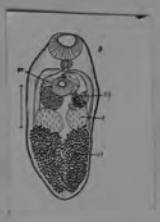
Genotype: *M. parvum* Simer, 1929 (Pl. 9, Fig. 113), in intestine of *Aplodinotus grunniens*.

Cercaria with two inner and four outer pairs of penetration glands develops in *Amnicola peracuta* — Hopkins (1937).

MICROCREADIUM Simer 1929

Small distomes, usually less than 1.mm. in length, with anterior end slightly truncated and posterior end slightly pointed. Oral sucker terminal collar-like. Prepharynx, pharynx, and esophagus present. Ceca reach to near posterior end. Ventral sucker close to anterior end, smaller than the anterior sucker. Testes at the center, lateral, at almost the same level. Ovary spherical, dextral, partly dorsal to the ventral sucker. Large spherical seminal vesicle, dorsal and anterior to ventral sucker, in the midline. Laurer's canal and receptaculum seminis present. Uterus short, containg few eggs, 104 by 64 u. Excretory vesicle extending almost to the testes. Vitellaria follicular, posterior to testes and distributed throughout posterior body region. This genus is to be classed under the family Allocreadiidae, but the absence of a cirrus pouch and oral papillae, and the position of the testes prevent its inclusion in any of the present recognized subfamilies of this group.

Type species: Microcreadium parvum Simer 1929



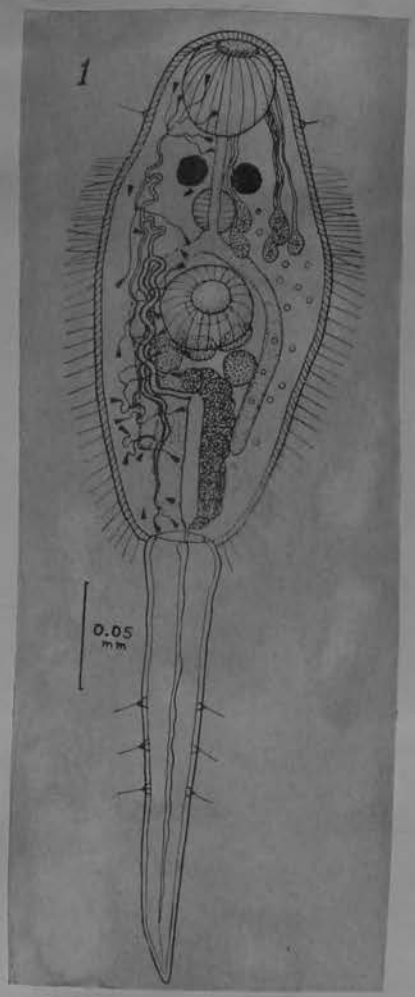
Host: Aplodinotus grunniens freshwater drum sheepshead
Tallahatchie River, Mississippi

Hopkins (1937) describes the cercaria from Amnicola peracuta in the Little Brazos River, Texas. It is an oculate cercaria with setae on body & tail. Similar in Anallocreadium cercariae (= Homalometron) from snail host

(over)

Lepocreadiids are almost entirely parasites of marine fishes. The subfamily Homalometroninae, however, occurs in marine, brackish water, and freshwater fishes. The genus *Microcreadium* Simer, 1929 from *Aplodinotus grunniens*, the freshwater drum or sheepshead, clearly belongs in the Homalometroninae, and the host is a member of a predominantly marine family of fishes.

From Manter, 1962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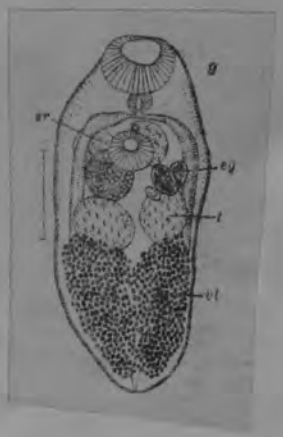
MICROCREADIUM PARVUM nov. spec.
(Fig. 9) Simer, 1929



From the intestine of *Aplodinotus grunniens*.

Specimens of this trematode were secured from 25 of the 41 hosts of this species examined. While the average number of parasites per host was about 250, more than 2,000 were taken from a single host. No activity was observed in any of the living specimens.

The average length of *M. parvum* is 0.66mm., and the average width is 0.31mm. The body is ovoid in shape and is provided with an abundance of small spines. The oral sucker is terminal, in the form of a low collar, and serves to cap the slightly truncated anterior end. The thin walled prepharynx is about 30 u long and is followed by a spherical pharynx having an average diameter of 40 u. The esophagus is about one half as long as the prepharynx. The ceca lie close to the lateral boundaries, midway between the two surfaces, and extend almost to the posterior end. The excretory pore is posterior and median and opens into a large, almost cylindrical, excretory vesicle which extends forward in the midline almost to a level of the testes. The ventral sucker is spherical and is located at from one third to one fourth of the body length from the anterior end. The relation of its transverse diameter to that of the oral sucker is as the ratio of 7 to 10. The muscular development of the ventral sucker is so weak that some doubt exists as to the functional activity of this structure. The testes are spheroid or ovoid, lateral and close together, and lie near the center of the trematode. The spherical seminal vesicle lies dorsal to the ventral sucker, in the midline, and has a diameter of about 0.1mm. The small tubule from the anterior margin of this structure passes to the ventral surface and opens at the genital pore just anterior to the ventral sucker. While the proximal portion of this tubule is surrounded with a few large, deeply staining cells which constitute the prostate gland, no further modifications occur and both cirrus and ejaculatory duct are therefore considered to be lacking. The ovary is spherical, about the size of the seminal vesicle, and lies slightly dextral, near the posterior margin of the ventral sucker. The oviduct which arises at the posterior margin of the ovary connects first with the large receptaculum seminis, and then with the common yolk duct. The former structure is spherical, about the same size as the ovary, and lies dorsal to it. Laurer's canal is present, opening in the midline at the level of the testes. The uterus has no coils and contains only a few large eggs, the maximum dimensions of which are 104 by 64 u. The vitellaria are follicular and extend from about the level of the center of the testes to the posterior end. The follicles are small but numerous, and are densely packed at all levels posterior to the testes with the exception of the midline, where they are less numerous but not entire lacking.

MICROCREADIUM

Myzotinae ~~n. subfam.~~ Yamaguti, 1958

Subfamily diagnosis. — Apocreadiidae: Body fusiform to plump, robust, with smooth cuticle. Prepharynx very short or conspicuous. Esophagus practically absent. Acetabulum large, pre-equatorial, provided with auricular flaps or lips of lamellar structure. Testes tandem or symmetrical, in posterior half of body. Seminal vesicle claviform or saccular, dorsal or posterior to acetabulum. Ductus hermaphroditicus (genital sinus of Manter) long or short. Genital pore median, pre-acetabular. Ovary median, immediately pretesticular. Vitellaria extending into forebody, and may well reach to oral sucker or pharynx. Uterus coiled between ovary and acetabulum. Excretory vesicle reaching to ovary. Lymph vessels?

Key to genera of Myzotinae

Acetabulum provided with lips of lamellar structure; testes symmetrical; prostatic cells profusely developed in parenchyma lateral and posterior to acetabulum .. *Marsupioacetabulum* Opisthotrabeculidae

Acetabulum provided on each side with an auricular flap; testes tandem; prostatic cells around pars prostatica and hermaphroditic duct ..... *Myzotus*

Myzotus Manter, 1940

Generic diagnosis. — Aprocreadiidae, Myzotinae; Body robust, covered with thick smooth cuticle. Oral sucker subterminal, followed by very short prepharynx. Pharynx well developed. Esophagus practically absent. Ceca wide, terminating at posterior extremity. Acetabulum large, preequatorial, with a conspicuous bilobed auricular flap on each side. Testes directly tandem, at about middle of hindbody. Vesicula seminalis claviform, free in parenchyma dorsal to acetabulum. Pars prostatica short, joining uterus to form a fairly long hermaphroditic duct (genital sinus of Manter). Neither cirrus nor cirrus pouch. Prostatic cells around pars prostatica and hermaphroditic duct. Genital pore median, at anterior edge of acetabulum. Ovary median, pretesticular. Receptaculum seminis and Laurer's canal present. Uterus between ovary and acetabulum. Vitellaria circumcecal, filling most of body from near anterior end to extreme posterior end of body, confluent in forebody as well as behind testes. Excretory vesicle tubular, reaching level of ovary. Parasitic in intestine of marine fishes.

Genotype: *M. vitellosus* Manter, 1940 (Pl. 31, Fig. 403), in *Caulolatilus* sp., probably *princeps*; Galapagos.

GENERIC DIAGNOSIS OF MYZOTUS *Manter, 1940*

Anallocreadiinae. Body robust, cuticula thick, smooth, with two conspicuous bilobed flaps, one on each side of acetabulum. Gonads tandem, unlobed. Cirrus and cirrus sac lacking; genital sinus long; seminal vesicle simple, tubular, uncoiled. Mehlis' gland, Laurer's canal, and seminal receptacle large; vitellaria extensive. Lymph vessels lacking. Type species: *M. vitellosus.*

Discussion. This allocreadid genus can be referred to the Anallocreadiinae because of its lack of cirrus and cirrus sac and its possession of a tubular genital sinus. It is, however, very different from other genera not only in its peculiar acetabular lobes but in its smooth cuticula, thick body, and extensive vitellaria. Crassicutis Manter, 1936 with its practically smooth skin is perhaps a related genus, but its general appearance is very different, its body flattened and wide, its gonads of different location, its ceca narrow, and its acetabulum unmodified. The muscular modification of the acetabular lips of Myzotus is suggestive of Myzoxenus Manter, 1934 (see p. 299), but Myzoxenus lacks a genital sinus, has a cirrus sac, and is without acetabular flaps. Myzotus shows considerable resemblance to Apocreadium Manter, 1937 and Choanodera Manter (see p. 345), notably in the terminal genital tubes which are practically identical, in the histology of the oötype region with its huge Mehlis' gland and large Laurer's canal, and in its excretory system. Furthermore, Choanodera does possess ventral body folds which, however, involve the entire forebody. The similarity to Choanodera was so pronounced, especially in the reproductive systems, that one could expect to discover lymph vessels in Myzotus. Careful search reveals no trace of such vessels. Thus again it is indicated (see p. 348) that lymph vessels may be present or absent in related genera. In this paper, Myzotus is considered in the subfamily Anallocreadiinae.

The name Myzotus is from *myzo* (= sucker) and *otus* (= ear) and refers to the earlike flaps of the acetabulum. The name *vitellosus* refers to the extensive vitellaria.

Allocreadiidae
Homalometrominae

GENERIC DIAGNOSIS OF MYZOTUS MANTER, 1940.

Anallocreadiinae. Body robust, cuticula thick, smooth, with two conspicuous bilobed flaps, one on each side of acetabulum. Gonads tandem, unlobed. Cirrus and cirrus sac lacking; genital sinus long; seminal vesicle simple, tubular, uncoiled. Mehlis' gland, Laurer's canal, and seminal receptacle large; vitellaria extensive. Lymph vessels lacking. Type species: *M. vitellosus.*

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FROM: ALLAN HANCOCK PACIFIC EXPEDITIONS, VOL. 2, NO. 14

Myzotus vitellosus, new genus, new species MANTER, 1940
(Plate 39, figs. 58-60)

Host: Caulolatilus sp. probably *princeps* (Jenyns)
Location: Intestine
Locality: Tagus Cove, Albemarle Island, Galapagos
Number: Many from a single host

SPECIFIC DIAGNOSIS OF MYZOTUS VITELLOSUS

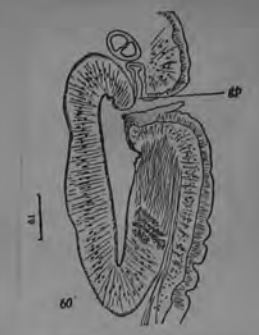
Body rather thick, elongated, rounded at each end, almost equally wide, 3.172 to 5.130 in length, 0.958 to 1.755 in greatest width. Cuticula smooth, very thick, and often thrown into folds, striated perpendicularly. Oral sucker subcircular, slightly wider than long, near anterior end, 0.277 to 0.435 in transverse diameter. Acetabulum about ⅓ body length from anterior end, apparently circular, 0.562 to 1.040 in diameter; sucker ratio about 1:2. Body wall on each side of acetabulum prolonged to form 2 pairs of flaplike muscular lobes or flaps (fig. 59) of very irregular outline. Each anterior flap more or less tapering to a free, rounded point. Each posterior lobe more or less separated from the anterior lobe by an indentation. Size and shape of posterior lobe variable. Acetabulum deeply embedded in body, typical except near its small aperture where there occurs a group of circular muscles (fig. 60) more conspicuous in the posterior lip. A peculiar group of longitudinal muscles (fig. 60) in ventral posterior wall of acetabulum near the aperture.

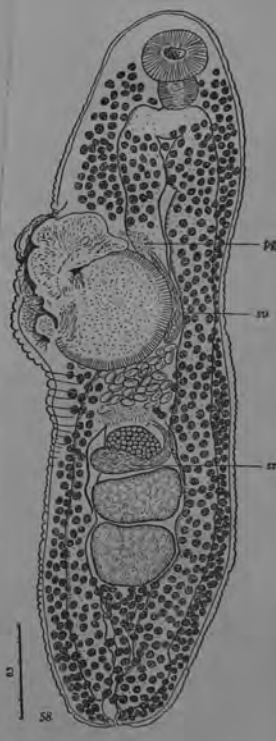
Prepharynx very short; pharynx of about equal length and width, 0.180 to 0.337 in diameter; esophagus lacking; ceca broad, extending to posterior end of body, often slightly sinuous, ending blindly.

Testes tandem, smooth, close together, intercecal, wider than long, about in middle of hindbody, posterior testis often subtriangular, posttesticular space variable. Cirrus and cirrus sac lacking. Seminal vesicle an uncoiled tube, free in parenchyma, entirely dorsal to acetabulum, claviform and almost straight except for its curve around acetabulum. A short pars prostatica joins uterus at middle of anterior surface of acetabulum to form a fairly long genital sinus. Genital pore median at anterior edge of acetabulum, well buried within body folds. Prostatic cells around male tube and sinus.

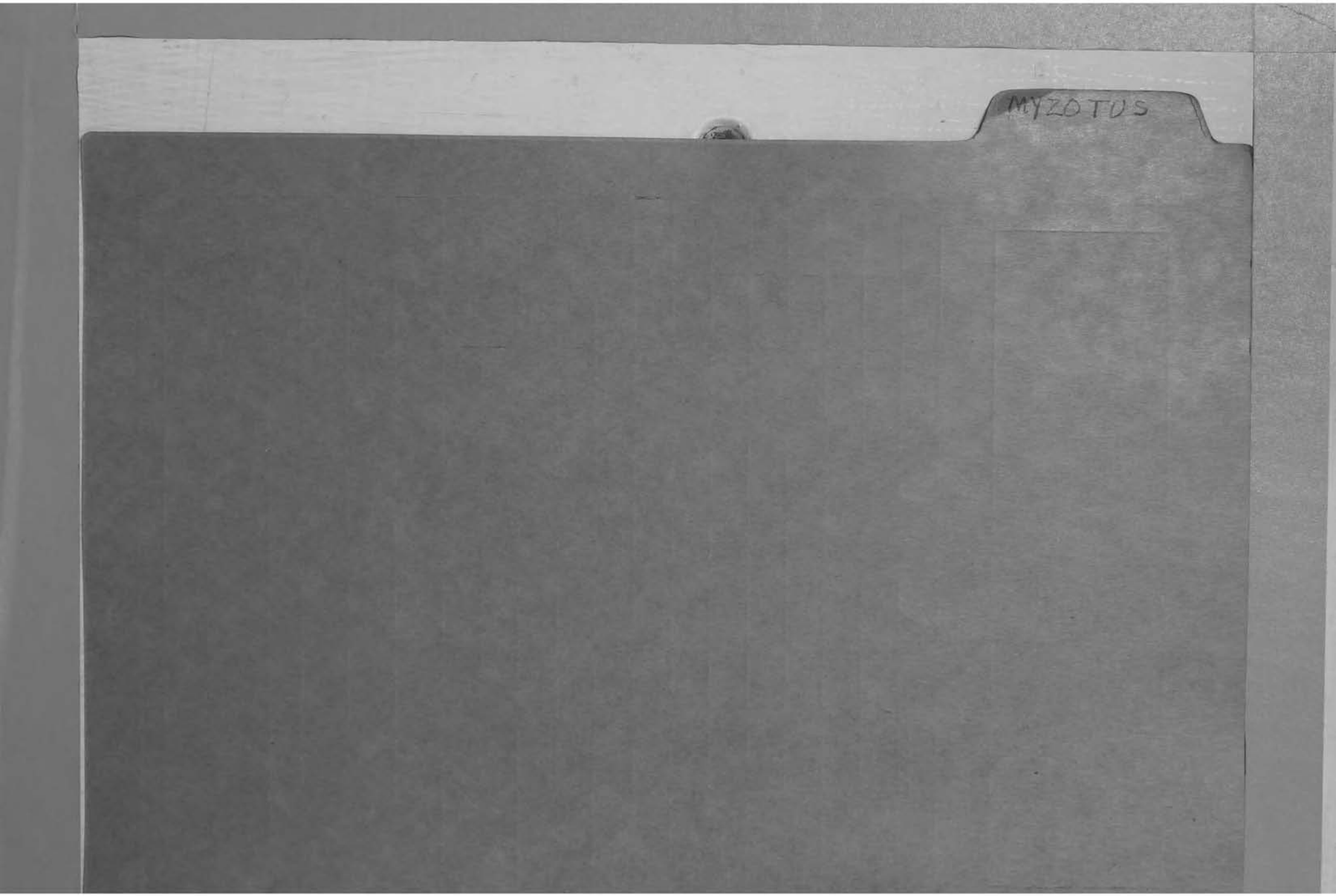
Ovary smooth, ovoid, wider than long, median, not far anterior to anterior testis. Mehlis' gland very large, immediately preovarian. Seminal receptacle flask shaped, chiefly between ovary and anterior testis. Laurer's canal large and muscular. (In one sectioned specimen this canal was distended with sperm cells with heads directed toward the oötype indicating that Laurer's canal functions in copulation.) Uterus between ovary and acetabulum. Vitelline follicles large, filling most of body from middle of oral sucker to posterior end, confluent in forebody and also posterior to testes, dorsal, ventral, lateral, and median to ceca. Eggs thin shelled and variable in size. In four specimens, eggs were 61 to 68 by 31 to 39 μ, but in one 5.130 specimen they measured 95 by 42 μ.

Excretory pore terminal; excretory vesicle extending dorsal to hind testis, then ventral to anterior testis to end at level of ovary. A pair of anterior tubules on each side extends to anterior end of body and a pair of posterior tubules extends to near posterior end of body. No lymphatic vessels seen.





FROM: ALLAN HANCOCK PACIFIC EXPEDITIONS, VOL. 2, NO. 14


MYZOTUS